Issue 5 September 2015

pyrotechnic MAGAZINE

FOR FIREWORK COMPANIES & ENTHUSIASTS ACROSS THE WORLD

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Astérix Parc 2015

by Christophe Blanc

Not everything is as it always seems...

HANNOVER 2015

This is RICASA

by Tony Gemmink

This year the international fireworks competition held in Hannover celebrated its 25th anniversary. This festival is held in perhaps one of the most beautiful locations ever chosen for a fireworks competition—the Herrenhausen Gardens, located in Lower Saxony's capital of Hannover, Germany—and is one of the most famous fireworks festivals in all of Europe.

+ much more

The Artistic Dynamism of David Sena

In trying to come up with a good title for this article, the word dynamism seemed apropos. Not the root definition characterized by "vigorous activity and progress,"...

Independence Day Fireworks in Goochland, USA

When either Memorial Day or Independence Day rolls around, I fervently search out the best possible fireworks shows to go to see in my area...

My Love For Pyro By Peter Verhoef

I think my love for pyro began very early in life. As a child, I remember blowing up the airplane models I built with firecrackers, and I also remember getting very excited by the band KISS...

WELCOME

First of all it is important for you to understand that I really hate tattoos. I guess it is because I'm older so in my mind (just like in the mind's of my parent's) tattoos are considered garish and low class.

When I taught high school at a juvenile detention facility in Missouri, my students there (many of whom sported a plethora of tattoos themselves) always would ask me if I would ever consider getting a tattoo myself. I always offered them the same pat answer: "I can't think of any picture or design I'd want to see on my body for the rest of my life." That said I want you to know that I would let David Sena ink a design on my skin. He's that good and his designs are that interesting. While most tattoos are more or less fancy clip-art you simply pick out of a book (kind of like lackluster press ons), David Sena's work is true art. His pyrotechnic work is true art, too—museum quality work exhibiting all the depth, precision and skill you'd expect from someone with the hubris to call themself an artist. David Sena is an artist, and his pyrotechnic artistry excels at capturing the exact moment the inner forces of pyrotechnics are released. Just like a professional photographer is able to capture the precise moment that a meaningful event occurs, David's work depicts that delicate dimension we experience in the blink of an eye, but can't really explain; that ethereal dimension that contains both energy and spirituality most contemporary processes are impotent to unveil. Every piece of David's work is exciting to look at and to absorb. And unlike most artwork, it is not his style or technique that draws you to his firework art, but his ability to control the uncontrollable. Be sure to read our exclusive interview with David Sena in this issue. It will be well worth your time.

Issue #5 is literally chocked full of interesting articles and photography. We take you to Trenton, Michigan (not too far from Detroit) to a beautiful public park display that completely lights up the nighttime sky over the Detroit River (photography by Zachary Olds). We also show you some amazing long exposure photography created by Christophe Blanc at another park (not in the U.S.)— "Astérix Parc"— just outside of Paris, France (you'll love these photos!). Then our publisher (Tony Gemmink) zips over to Hannover to cover the 25th anniversary of the international fireworks competition held in the Herrenhausen Gardens, located in Germany. And then we add some Independence Day fireworks photography by Debra K. Roberts (isn't 4th of July fireworks a must?) taken in Goochland County, Virginia. As if that wasn't enough, Roy and Yvette Houwers also cover the huge "Japan Day" festival held in Düsseldorf that over one million people attend annually.

On a more technical note (for you "pyrotechnophiles" out there), we have included a thorough

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explanation of the perfect combination for maintaining the high speed performance of data in firing systems by Luigi Leone Paolo Monetti, and additionally, in another article, we've provided an in-depth analysis of a new firework production method called Pyromould® This pyromould process is designed to be safer, more ecologically sound and less expensive to produce. Jos van der Veen examines the claims the company makes regarding this new product, as well as its viability and usage.

We have also included a serious discussion about the love of fireworks in the Netherlands and the myriad of false accusations that regularly threatens the future usage of fireworks there. Personally, I've always felt that "fireworks accidents" are generally stupidity accidents. For example, if two teenagers fire Roman candles at one another and one young man loses an eye, is it really a fireworks accident? If you hand a sparkler to a 2-year-old (that burns at 1200 degrees Fahrenheit/649 degrees Celsius) and they grab it and get a 3rd degree burn, is that really a fireworks accident? I don't think so, but these are the kind of unsupervised misuses and thoughtless incidents threaten our entire industry.

So, interesting content, beautiful photography, great video links and pyrotechnics galore! Everything a pyrotechnic magazine should contain. Thanks for being one of our thousands of subscribers, and thanks for taking the time to read this issue. Be sure to email us, too, with your ideas for future articles, and to tell us what you think about this issue.

Michael Richards
Editor, Pyrotechnic Magazine

ISSUE#6

pyrotechnic MAGAZINE

FOR FIREWORK COMPANIES & ENTHUSIASTS ACROSS THE WORLD

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- Hellfest 2015
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"Tag" in German (pronounced "tahg"), means "day." For each of the last 13

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In trying to come up with a good title for this article, the word dynamism seemed apropos. Not the root definition characterized by “vigorous activity and progress,” (although that works, too), but the philosophical theory that states “dynamism is a phenomenon of matter or mind due to the action of forces, rather than motion or matter.” If you’ve seen David’s use of pyrotechnics in his artwork, then you certainly understand...

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96 Trenton, Michigan on the 4th of July

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Thanks to the generous sponsorship of Fritz Enterprises, the city of Trenton was able to put on an amazing fireworks show this past 4th of July. Trenton is a relatively small town (just shy of 20,000 people) located about 23 miles south of Detroit...

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If you have an ideas for an article, have any interesting fireworks photograph or have written an article that you would like to see in an upcoming issue of our magazine, please e-mail tony@pyrotechnicmagazine.com

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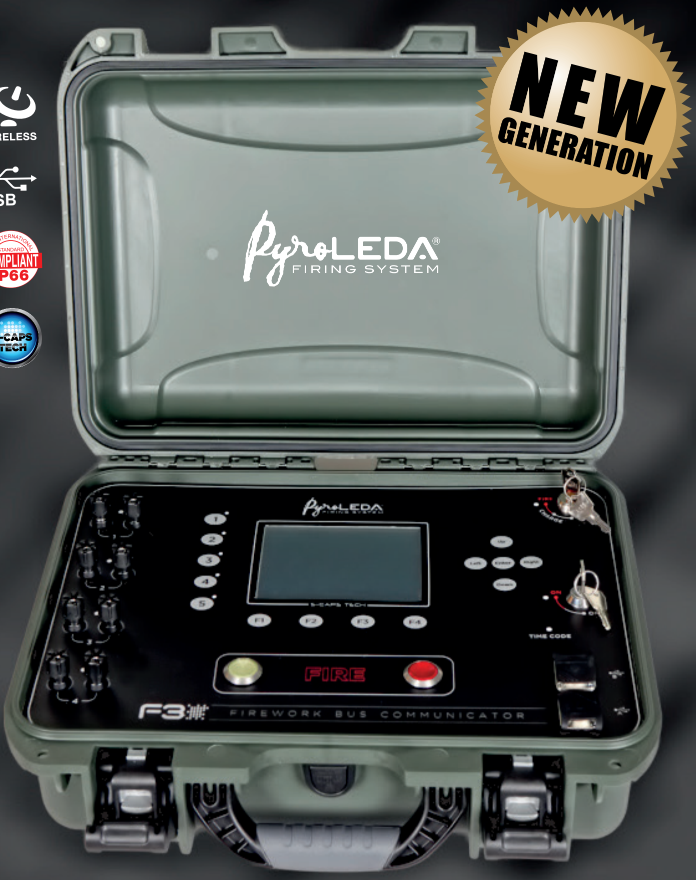

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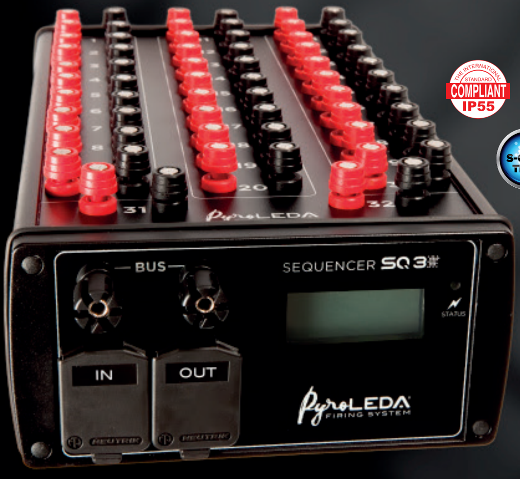

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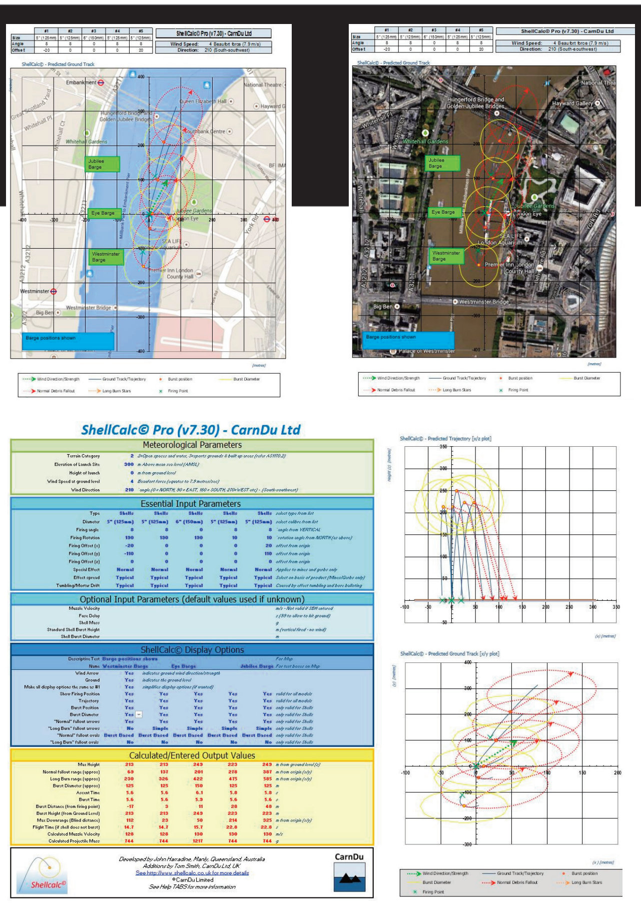

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By Peter Verhoef

I think my love for pyro began very early in life. As a child, I remember blowing up the airplane models I built with firecrackers, and I also remember getting very excited by the band KISS after I bought their ALIVE II album in 1977 and saw an amazing picture of the band onstage surrounded pyrotechnics and flames! I knew at that moment I wanted to do just that! In 1980, I had the opportunity to see them live in Holland and they really blew me away! →

MY LOVE FOR PYRO

My pyro dreams began to become fully realized in 1988 when some friends of mine in a rock band wanted some onstage pyro accompaniment during one of their shows. I bought a 2-way Le Maitre firing system and shot some smoke bombs, jets and fountains. I had to change the effects several times during the show, though, because I had only 2 pods.

A year after that, a friend of mine built me a 20-channel firing system. Now, I had the power to do bigger and better things! Also, the band I was working with got booked to do bigger shows, and they wanted larger, more awe-inspiring effects. I was happy to comply. More bands hired me after that because they all wanted stage pyrotechnics in their shows, and I was having the time of my life!

As I became more involved with stage pyrotechnics, I realized that there was a fireworks company right in my own town. I called them up and talked to them about what I had be doing and I wound up helping assist them by doing my first-ever New Year's Eve show.

The company I worked for as a freelancer was called "SKYLIGHT fireworks," and I did quiet a few shows for them. The biggest show I was involved in (which was an annual show) was a the Nijmegese Vier Daagse, which was shot from a large boat in the middle of a river, and the Scheveningen International Fireworks Festival (which is kind of funny because when we started, we shot all the shows ourselves because there were no other countries involved!). I also went to Tarragona, Spain to the Tarragona International Fireworks Display Competition so SKYLIGHT fireworks could compete. This is a very prestigious event in Europe, and although we didn't win, it was a great experience.

Peter Verhoef

One of the coolest pyro-related things I ever did while I was in Holland involved a course I was teaching in leadership for Landmark Education. I had to come up with a specialized project for that course, and I had just seen a television program about how hearing-impaired individuals could enjoy music by feeling the vibrations in the floor. That got me to thinking about the visually impaired. People who are blind tend to hate fireworks. In fact, the closer it gets to New Year's Eve, the less they go outside because kids shooting fireworks in the streets startle them and their guide dogs. So, I wondered if I could change that.

Since there was a blind individual living nearby me, I asked him if I could interview him regarding fireworks. He agreed and what I discovered while talking to him was that when fireworks are coupled with music, he actually enjoyed them—especially when the fireworks loudly punctuated climactic points in the music itself.

That became the foundation of my project: a pyromusical for the blind; a project full of creative ideas specifically designed to →

Göteborgs Fyrverkeri Fabrik at the Millenium Stadium, Cardiff in Wales UK

Liseberg Christmas Pyromusical

Peter Verhoef

MY LOVE FOR PYRO

meld the sounds fireworks make with music. I called a company I knew in Holland that specialized in choreographing pyromusicals— De Koster Pyro—for help. And together we chose Feuerwerksmusik, the "Music for the Royal Fireworks," written by Händel as our basic thematic music.

We also decided what was needed most for this type of show was fireworks that made a variety of noises. Fireworks like whistling fountains, crackling fountains and booming firecrackers. In addition, we thought it was important to include things you could feel (in a safe way) like the heat from flame projectors, confetti airbursts and aromatic smells of vanilla or strawberry that could be made come out of smoke machines.

Contrary to what you might you might think, we decided this fireworks event should be an indoor pyromusical—one you could hear, feel and smell (all three would have been difficult outside).

Since the course I was teaching would be over in 3 short months, I had to put this together quickly and I needed an effective way to invite a large number of visually impaired individuals to the show. I began by calling institutions that provide education and instruction to the blind and offered them invitations, but when the media got wind of our project, our necessity to advertise became immediately unnecessary. Suddenly, we were being interviewed on the radio, interviewed in the newspaper and even had a TV interview on a nationally televised show watched by millions of people.

Peter Verhoef

On the day of the show, around 300 visually impaired people showed up to hear, smell and and feel our pyromusical. We played to a completely full house, and the show was well received and enjoyed by everyone. Newspaper reviews of our event were excellent, too, and there was even video footage of our show on the evening news. The entire experience proved to be amazing. How often do you have the opportunity to see one of your ideas grow into a popular event?

In 2003, I moved to Sweden. Since I didn't really know anybody there, I began to look around to see if I could use my hobby to make a little extra money.

I always enjoyed working at concerts as a lighting technician, so I contacted Live Nation Swedish and got a job working on one of their local crews. After 1 year I became a "crew chief" and did that quite often for fun and extra money.

At the moment, I live in Gothenburg on the west coast of Sweden. There is a company here called "The Gothenburg Fireworks Factory" (Göteborgs Fyrverkeri Fabrik, or GFF), and I contacted them when I first got here, but they didn't have any work for me. Sweden is a kind of paradise for fireworks enthusiasts because you can buy them all year round. Since I think every birthday party or holiday needs fireworks, I visited that company quite often. After about a year, the factory asked me to help them with one of their New Year's Eve shows, and after that, other pyrotechnic jobs came my way. Since I've always liked doing indoor pyro, it was an excellent way for me to begin, and many people learned I had pyrotechnic capabilities as I helped them do shows.

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MY LOVE FOR PYRO

Peter Verhoef

In my "normal" life in the past, I was a newspaper printer, and I did that job for 17 years in Holland and then in Sweden for 5 years working for a large newspaper operation in Gothenburg. After 5 years, however, primarily due to the economy, I had to find other employment. Fortunately, the Gothenburg Fireworks Factory was looking for a fulltime employee. Misfortune quickly turned into luck, and I was hired immediately.

Together with my colleague, Ingemar, we're responsible for a lot of the firework productions our company produces. Generally, we get a list of what is necessary, and then we outline much of the entire show. Some shows we create require over 4000 different effects! Of course, we don't work by ourselves. Right now there are 5 fulltime employees that work at GFF (Göteborgs Fyrverkeri Fabrik), and this is how the work is divided: Martin Hilderberg, our boss, does the designing for our pyromusicals, Susanne, does most of our outdoor fireworks, Maria is responsible for administration and then there is Ingemar and me.

Since New Year's Eve is such a busy time for us, we also employ about 40 freelancers to help us out doing the numerous New Year's Eve shows we produce. It is important to note that GFF in Sweden works much differently than I was used to in Holland. Here, they shoot almost every show using firing systems. In Holland, I'd say at least 80% of the shows are shot by hand.

Our company also creates and choreographs a great many elaborate pyromusicals (Martin's specialty) as well as arena shows like the closing pyromusicals done after the motor speedway Grand Prix. I love helping with these Grand Prix shows, they are always a lot of fun and the kickass response you get from the audience leaves you feeling accomplished. For the last 5 years I've gotten to fly to Wales to do our biggest show in front of a crowd of 45,000

Peter Verhoef

Speedway Fireworks prepped and ready to shoot

people. They go nuts there after they watch one of our pyromusicals, and it always leaves me feeling great afterwards.

My boss, Martin, also loves to compete in firework competitions. Because he is so talented (and obsessed with perfection) we've won the Swedish Pyromusical Competition 10 years in a row!

Some jobs, of course, turn out to be unforgettable experiences. The 2010 pyromusical we did in Montreal when we won silver was one such job for me. Also, the 2009 show in Knokke when we won gold in the International Fireworks Festival Knokke-heist was memorable. Other great experiences I've had: The opening pyromusical for the ABBA museum in Stockholm when I got the chance to talk to Björn from ABBA about fireworks, and our show in Shanghai in 2011 when we shot one of our best shows ever. Big isn't always what pyrotechnics is about, though, because I thoroughly enjoyed the small, onstage show we did for Snowy Shaw this year that ended up on his DVD.

Peter Verhoef

Peter setting up a daylight display

In 2015 we'll be going back to Hannover to enter a pyromusical competition there for the very first time. Then it is off to the Philippines for the PIPC in February, and many more shows after that throughout the year. Most of what I design now for GFF is the smaller indoor shows, and I'm pretty much given a free hand in how it looks. I'd have to say, overall, I love working for GFF. Like a wise man once said: "If you find a job you love, you never have to work a day in your life." So, lets give them a show to remember. ■

PYROM

MOULD®

Written by Jos van der Veen →
www.pyromould.nl

Two years ago, Lesli Fireworks, a fireworks importer to the Netherlands, introduced a new concept to the Dutch consumer fireworks market: Pyromould®. Pyromould® was invented and developed by Liuyang Yihelong, one of the biggest fireworks manufacturers in China. This product production technique was designed to improve the speed of fireworks production and reduce labor costs. This article will explore the advantages and disadvantages of this new production method.

SPECIFICATIONS

The product itself is named "Pyromould" because it is actually formed within a mold ("mould" in British English is the same as "mold" in U.S. English). Unlike other fireworks cakes, this mold base is made of all natural materials: cellulose fiber (the same material used in paper); starch (used as a binder); and calcium carbonate or "calcite" (used as a filler and enhancer). Mixed together with a little water, these ingredients make an elastic, somewhat airy dough. This dough is then inserted in the "female" section of the mold that defines the outer shape of the cake, then closed by the "male" section that pushes lances (used to create the tubes) into the dough mixture. The process itself is somewhat secretive and proprietary, but it appears the molds are either pre-heated or heated through canals in the molds as they are closed. After closing the molds, the soft cakes and the dough that is divided throughout the mold, hardens within a few minutes, shaping the inside of the tubes and the outside of the cake. Once the cakes are released from the molds, they are flash-baked so any moisture that remains will evaporate quickly. Finally, after the loose/hollow structure dries and cools, holes are then drilled in the bottom of each cake to prepare them to be fused. The drilling of holes for the fuses could have possibly been done while still in the mold, but debris and residue left over during the molding process could easily clog the small holes making them un-fusible.

Unlike the rest of the process, the fusing is done manually. (It could be done mechanically, but that would increase costs by requiring expensive robotics). After the fuse holes are drilled, a layer of fire-delaying paste is then applied to prevent the chance of cross-firing. During the final phase of production, the label is applied, and the cake is filled with lift, cardboard disks and bombettes.

The major advantage of this technique (as compared to the conventional production of cakes) is that it requires fewer operators/workers to make them so it keeps per unit costs lower. In addition, the chance of having weak or defective tubing is reduced. By using a molding technique like this, the tubes are all consistent in diameter and consistently reproducible.

One slight disadvantage (offset by reduced labor costs) is that the materials used during production are slightly more expensive (due predominately to the cost of starch used to create the mold paste).

ASSERTIONS

There have been a wide variety of assertions made regarding the Pyromould® processing technique since its inception. The following overview is an attempt to separate fact from hyperbole. Regarding consumer fireworks,

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we'll examine safety claims, environmental claims, production claims and quality issues.

Safety claims:

- Greater stability due to the shapes produced (cake will not tip over)
- No perforations
- Pyromould® cakes are fire resistant
- Very low moisture absorption (< 4-5%).
- The chance of a tube burst or low altitude explosion is negligible

Generally, claims like these are quite easy to make, but safety issues are often multifaceted and exceptionally complex so it is necessary examine safety through the eyes of the users and not the manufacturers. Yes, there is stability due to its shape, but only the outside perimeter of the bottom of the cake is touching the ground, so you'll need to place it on a flat surface. Likewise, the consistent shooting tempo between shots adds to the stability, as does the negligible chance of cross-firing because there is no second pressure wave from the previous shot.

Pyromoulds are mainly made to be fairly large and come in 16-shot, 19-shot (hexagonal shaped), 25-shot, 36-shot, and 48-shot sizes. Larger sizes on flat surfaces do not tip over easily. Having no perforations is also a big plus. That is where conventional batteries often have problems.

Fusing from the bottom (instead of the sides to top) is also a good safety feature and makes it easier for rapid ignition of the lift charges. With bottom ignition, the flames coming out of one tube are not likely to ignite the lift charges of any other. The fact that the molded material doesn't burn easily either (even when surrounded by fire) makes them a good choice for most pyrotechnicians.

Another added benefit of molded tubes—so they say—is that there is less chance of a tube burst (although there is no specific data available to prove this claim). It does make sense, though, since the tubes are essentially equal in size and very sturdy. Dependent on which bombette is used, the altitude at which the bombette bursts should definitely be more consistent.

The low moisture absorption is also a major plus. We were confused by this claim, however, since the fibrous material that allows them to be recyclable should also cause them to absorb moisture in order to soften, not repel moisture.

Environmental claims:

- Pyromould® is made out of plant fiber, starch and calcite
- These components are 100% recyclable

Dependent on which company manufactures them and their overall design, you can quite often find iron wire, plastic tape or even HotMelt (residual glue) in conventional cakes. You won't find any of this bric-a-brac in Pyromould® (we do wonder what the "white paste" is actually made of that prevents cross-ignition, though).

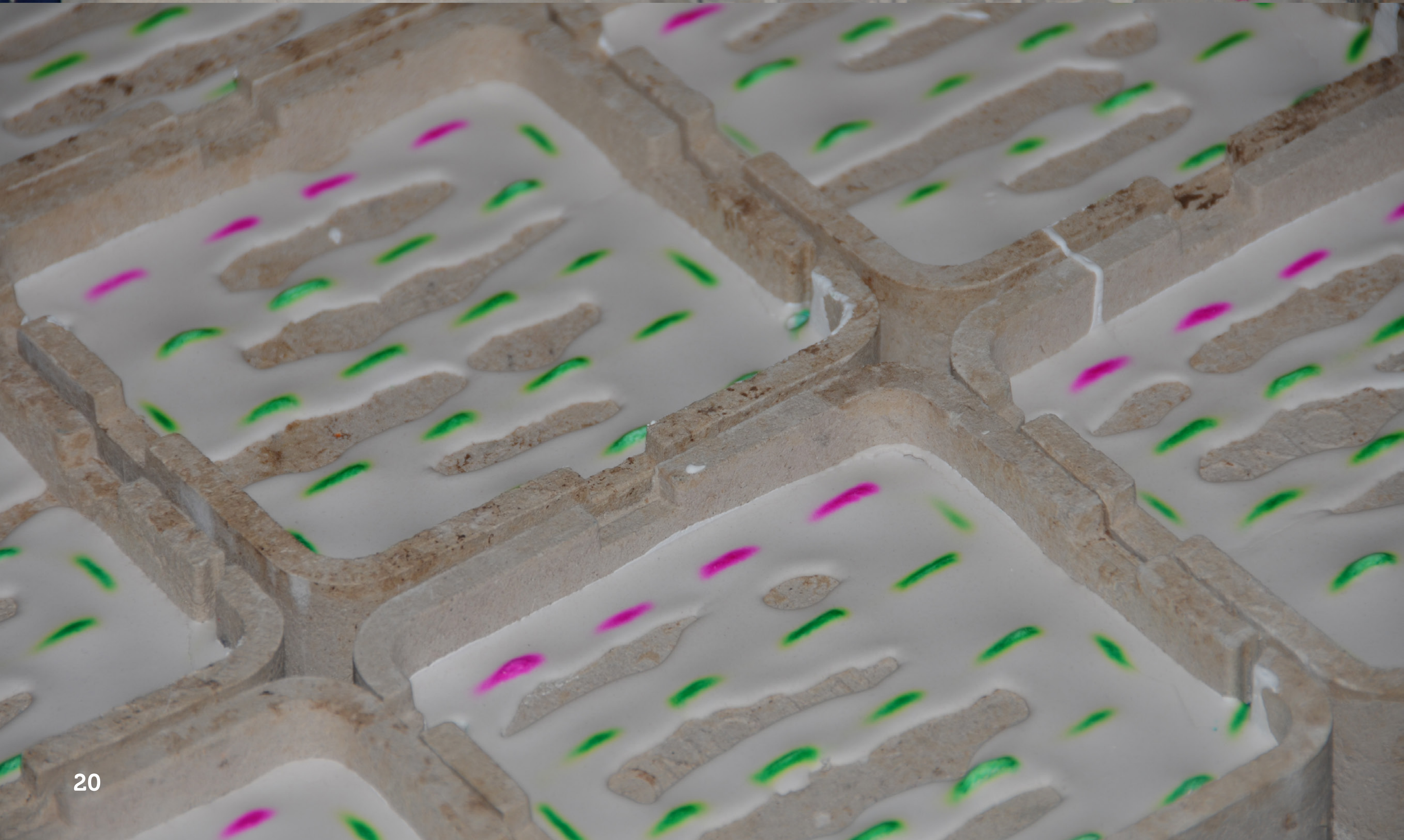
As we already noted, the "100% recyclable" claim is rather confusing. First of all, conventional fireworks in Holland are classified as "other-waste." They are classified this way because conventional cake paper cannot be separated from the clay plugs inside. To be 100% recyclable, Pyromould® would need to be discarded and classified as "paper waste" instead. Here is what confused us: As an experiment, we had a pyrotechnician we know put one of these cakes in a bucket of water for ten days. And after all that time in water soaking, the molded material was still quite hard and seemingly insoluble. Since recycling plants don't pre-wet or soak anything, but simply crush and cut water soluble materials, how is Pyromould® 100% recyclable? We can certainly accept biodegradable, but we seriously doubt its 100% recyclability claim. The Dutch authorities in charge of paper recycling agreed with us when we asked them about the viability of Pyromould's recyclability, and underscored another aspect we hadn't thought of: in addition to its insoluble design, there are also internal pollutants and residual chemicals left as residue from the burned powder. Under Dutch law, such fireworks remains must be discarded as solid waste and will not be recycled. Yes, the fiber component is 100% recyclable, but the product isn't and shouldn't be marketed that way.

Faster Production Claim (directly linked cost and supply):

- Reduced labor necessity
- Product is not as labor intensive to produce as conventional cakes
- Product is not affected by bad weather conditions

The reduced labor factor is perhaps Pyromould's best selling point. Especially now, with fewer and fewer Chinese willing to do menial jobs for low wages and regular wage increase demands in China ranging from 5%-10% per year. It is important to note that workers running their mold line need to become skilled operators of the machinery. Skilled workers must be properly trained and are then usually paid higher wages. Remember, Pyromould's basic production still relies on a large number of workers for fusing, pasting and filling, so this process is semi-automatic at best. Maybe when the process is fully automated they will save substantial labor costs, but it is difficult to see that kind of savings at present.

On a more positive note, their claim about Pyromould's production not being effected by bad weather is essentially correct. It mainly has to do with their fast production process and the fact that there is no further need of drying the mold after it is produced. Conventional tubes, on the other hand, need to be dried for several days. However, when it's too hot, the production of Pyromoulds (like almost every other firework) comes to a complete stop because of safety issues. Filling them is quite similar to filling any other firework product, →



especially when it comes to the bombettes. The layout of the factory, though, and the faster production line does allow them to make up for lost time at a much faster rate.

Quality Claims:

- Consistent shooting height and direction
- Accurate tempo of the effects
- < 0,5 mm deviation for inner diameter and height of the tube
- Complete function
- Strong body
- Consistent quality of whole production batch

As far as we can tell, all of these claims are true. The diameter of tubes is definitely more consistent as a result of the molding process, indicated by negligible deviation in measurements. Their claim of "accurate tempo" also holds true as the distance between the fuse holes is always the same. Together with placing the fuses at the bottom, the safety and time consistency of Pyromould® cakes makes it the perfect choice for displays.

USING PYROMOULDS IN DISPLAY

Now that Pyromould® products are readily available at the consumer level, you would expect to see them popping up in professional displays as well. That is not the necessarily the case, however. What we're hearing from professionals in the field is that Pyromould® is very difficult to prepare for electronic ignition.

The workaround for this is to bind the igniter and fuse together with the help of little incisions in the fuse, and then to tape the e-match to avoid any time delays. Donald Stevens showed us an excellent method for doing this sort of direct ignition on the first tube.

If you are going to use this technique, you first get rid of the foil on the bottom so you can locate the main fuse. Next, you get rid on the film or paper on top. You'll see that some of the tubes in Pyromould are actually empty and smaller than other firing tubes (probably for overall consistency sake). Don't make the mistake of placing an igniter in one of those slots.

Finally, take an awl and pierce a hole as big as your igniter requires in the first firing tube at the recommended height. The recommended height is the distance from the bottom of the cake to the inner faux bottom (add 5mm to account for the thickness of the bottom of the tube).

When you pierce the Pyromould® material, you'll know immediately if you've hit the lift charge, because it makes a distinctive sound and you'll be able to feel it. The first few Pyromoulds you prepare with e-match should be measured out, but after installing a few dozen measuring probably won't be necessary.

COPYCATS

Every new invention that works well—and sells—gets copied. The Chinese have developed somewhat of a reputation for copying successful products and selling them as knockoffs or under new brand names. Such is the case with Pyromould®. Yihelong makes the bombettes and works closely with another company to produce the effects.

When you see Pyromoulds in use (like we saw recently in Hestia at the Pyroforum in Witten), all of the effects should be consistent and exact (the way Lesli Fireworks designed them). If they lack consistency, or there are noticeable defects (like missing tubes) then it probably comes from another manufacturer. The credible key is under the bottom foil: when you tear it off, you should see the name "Yihelong." Of course, that doesn't mean that the product being used is terrible, but knockoffs are rarely as precise or as well made.

After studying this product at length, we really don't understand why Yihelong has chosen to limit themselves to only a specific number of effects. Rightfully so, they want to be the controlling partner for every Pyromould® product, and they want to focus on the creation of the molds—which is their core business. At the same time, however, they want to leave making bombettes and other variances to other companies, which we think might be a mistake in this quickly evolving market in the long run.

CONCLUSION

I think it's safe to conclude that the main reason this product has been successful is because its production requires fewer workers and keeps production costs lower. The Pyromould® itself has not really increased quality, though, because "quality" has more to do with whatever bombette or other variance is being used then the shape or quality of the mold. There are some definite benefits to using Pyromould®—especially because the process itself limits the chances of human error during key production steps. And it is fair to say that as a result of this new Pyromould® technique, safety and quality have indeed been improved as they have claimed. ■

SOFTWARE

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PyroLEDA®
FIRING SYSTEM

- TimeCode Generator
- PyroLEDA®Updater
- SQ3 Programmer
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RT3

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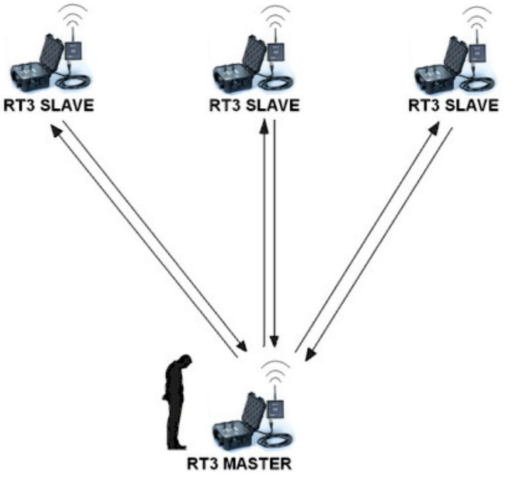

AT3

TP3

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S3

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Video 1

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INDEPENDENCE DAY

FIREWORKS IN GOOCHLAND, USA

Written by Debra K. Roberts

When either Memorial Day or Independence Day rolls around, I fervently search out the best possible fireworks shows to go to see in my area. Fortunately, Richmond, Virginia and its surrounding counties offer an overabundance of excellent shows to choose from—especially if you love photographing great pyrotechnic festivals. I'm not sure exactly what it is about the 4th of July, whether it is just an American sense of patriotism toward our Founding Fathers and independence, or simply the love of the outdoors coupled with a good excuse to eat drink and shoot fireworks. Either way, the 4th of July holiday in the United States is almost universally loved. Other things you see almost everywhere that day are American flags and red, white and blue. They are the predominant colors used in almost every fireworks display that night, too—regardless of who is doing the shooting.

Another thing my husband Jimmy and I try to do on our 4th of July excursions is to include our grandchildren. Someday they might understand the truer underlying importance of these holiday festivities, but for now it's all about traveling with the grandparents and watching great companies like Dominion Fireworks (www.dominionfireworks.com) put on a spectacular show.

One of our favorite Independence Day celebrations is actually held very close to where we live—in Louisa County, Virginia (about 30 miles northwest of Richmond). An adjoining county, Goochland (about a 30 minute drive south), puts on a wonderful fireworks display every year. We discovered this show in 2014 when Zambelli Fireworks (www.zambellifireworks.com) was the chosen to do the show. The Goochland Parks and Recreation Center officially sponsors the display, but it was all Zambelli that night, and Zambelli is one of the best in the business! Unfortunately, I didn't have the best position to photograph the full show, but I was pleased with many of the shots I got anyway. Goochland Parks and Recreation published two of them to promote this year's event: one on the cover and the other inside their summer programs edition.

Because of my 2014 photographs, Goochland Parks & Recreation offered me a seat in their press box for the 2015 event. That was nice of them, but I should have scouted the area beforehand because from that position stadium lights were in the foreground. Don't get me wrong, I like to have a good foreground in some of my images, but →

INDEPENDENCE DAY

FIREWORKS IN GOOCHLAND, USA

All firework pictures © Debra K Roberts Photography 2015
www.debrakroberts.com

my preference is to capture the essence of the fireworks themselves. The challenge is to grab multiple bursts and still have good color saturation. But the box seats were nice, and I made the best of my location and started snapping away.

One thing I love using when I take photos of a show like this is my remote. A remote makes it possible for me to look up and not just see the world through a viewfinder. This allows me to actually enjoy some of the show while I am taking the pictures. This year I added a variable Neutral Density (ND) filter, too, which allowed me to adjust the exposure without having to change the settings on my camera. By using a ND filter, it enabled the camera to capture better color so during post processing I could increase the intensity and give them better clarity. Overall, this makes a much more pleasing image.

As a photographer (and as a spectator), the 4th of July holiday is one of my favorite times of year. I'm always exceptionally grateful to the incredibly creative pyrotechnic companies who put on these wonderful shows. I remember back to the very first time I photographed fireworks. It was a competition held by a local pyro club. I had a new camera and really didn't know what I was doing. By the end of the show, however, my pictures were good and I was hooked. Today, since photo editing is so time consuming, I am much more picky about where I go and what I photograph. But fireworks photography remains one of my personal passions and always will. It has been one of my greatest inspirations. ■

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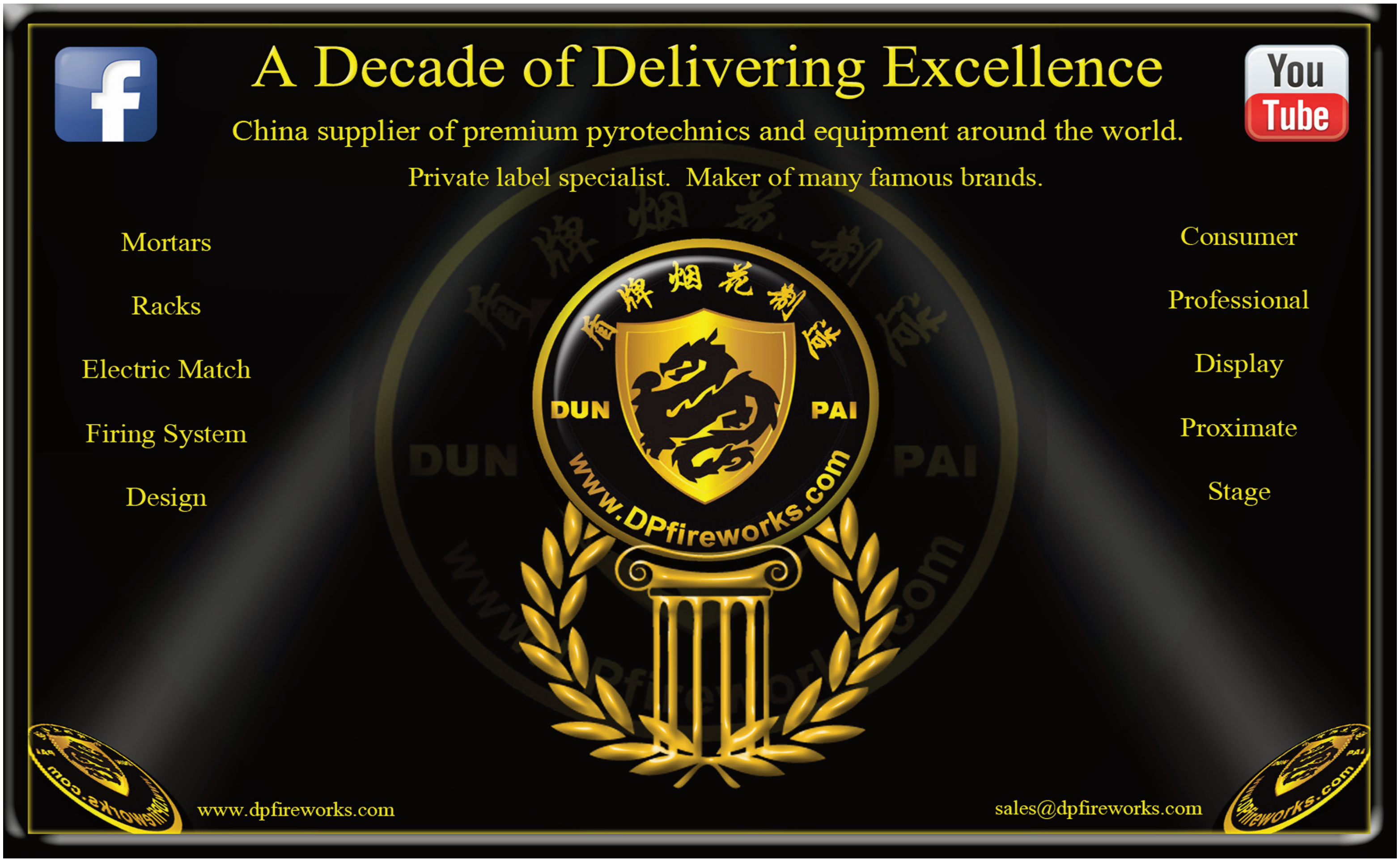

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Parallelism & Hybrid Communication

THE PERFECT COMBINATION FOR MAINTAINING HIGH SPEED AND PERFORMANCE FOR DATA EXCHANGE IN FIRING SYSTEMS

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PyroLEDA®
FIRING SYSTEM

Written by Luigi Leone Paolo Monetti

INTRODUCTION

The most recent innovations of the PyroLEDA® and SuperMaster systems (both fully compatible with existing hardware) relate to two main features:

- The massive use of hierarchical parallelism in communication to manage an enormous number of ignitions (over 130,000 cues) without affecting the speed of diagnostics or control.
- The use of different communication vectors at the same time, in an innovative "hybrid" form, to make the system more flexible in adapting to different topological and regulatory situations.

In this article we will highlight the advantages that this architecture offers for managing the most complex needs of a display. →

S-CAPS TECH
F2
F3
F4
FIRE
K BUS COMMU

REQUIREMENTS FOR REAL PROFESSIONAL FIRING SYSTEMS

The most fundamental requirements for a professional firing system can be summarized as follows:

1) Built-in safety features to protect human life in the case of malfunction,
2) Accurate execution of displays with a high level of precision to the microsecond and the total elimination of any lag,
3) A universal synchronization system (TimeCode).

In addition, (and in our view all operators in the sector would agree) that a professional firing system for use in important events should also have these features:

a) No more than a few (max. 2/3) different types of hardware.
b) Potential expandability of the system.
c) Rapid exchange of data between the different hardware modules in the field.
d) A control console with a rapid and intuitive interface (program transfer, diagnostics and show management).
e) A flexible wireless system.
f) Backups without modification to field layout.
g) Ample energy autonomy.
h) The possibility of multimedia interaction.

As you will see, all of the characteristics listed above (1-3 and a through h) are integrated into the new PyroLEDA® system.

DISCUSSION

Massive Use of Hierarchical Parallelism

This type of arrangement is sometimes called a "distributive process" or "distributive system." We have decided to call it "hierarchical parallelism," to more accurately express the idea underlying the system itself. It's a bit like saying "All roads lead to Rome." In other words, all hardware modules belonging to the system are connected directly or indirectly to a single, remote control console used by the operator. The following clearly illustrates the concept of "hierarchical parallelism" diagrammatically as a pyramid consisting of three levels:

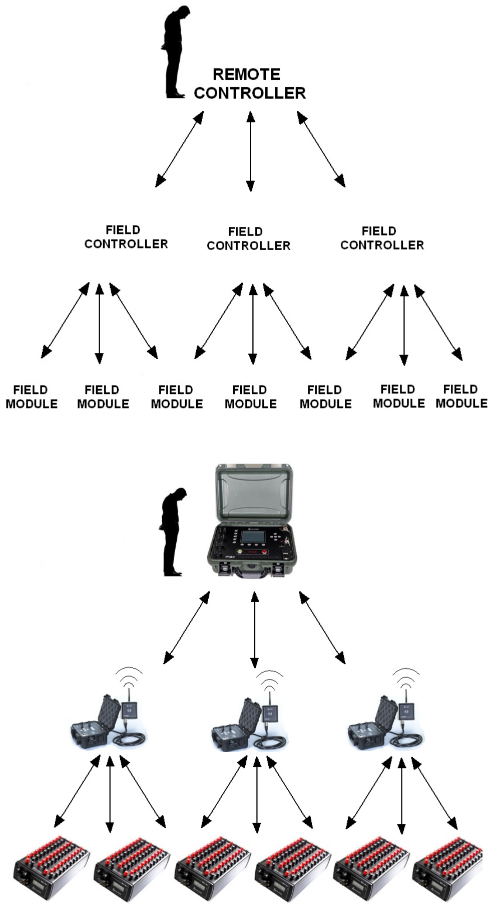


Figure 1 - Parallelism

In this configuration the SuperMaster version of the PyroLEDA® system is comprised of only 3 types of hardware for the management of a display.

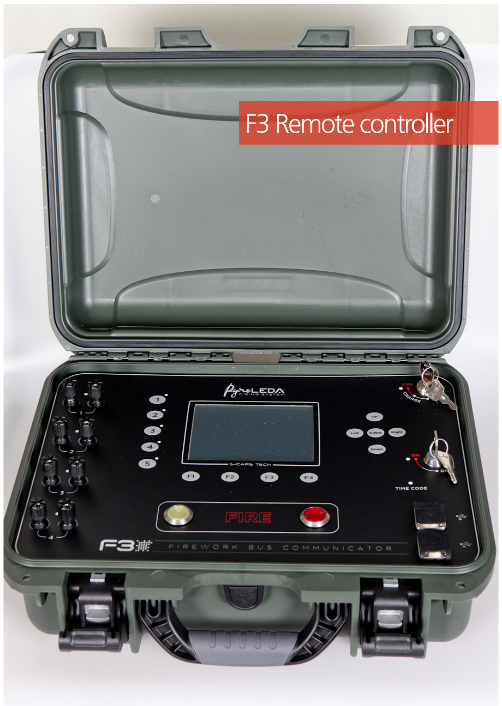


Figure 2 – Only 3 types of hardware

The system is made up of a remote controller (F3), which is linked to the field controllers (RT3) that in turn communicate with the firing modules (SQ3). Data exchange is of course two-directional at all levels of the pyramid. This much is probably already familiar because almost all firing systems have a similar structure. What is important to note about the architecture of this system is that the data exchange between the various levels takes place simultaneously—in parallel and in even time—regardless of the number of controllers and field modules involved in communication. So, whether you use a single RT3 or hundreds of RT3s, the time required for the exchange of data remains the same due to parallel communication.

The massive use of this pyramidal structure allows for the management of a considerable quantity of hardware and a higher number of cues. Its expandability is augmented because a single F3 controller can communicate with up to 256 RT3s. In turn, each RT3 can control up to 16 SQ3s for

Table 1 - Maximum number of hardware units controlled by one F3 controller

F3 Remote controller		1 unit can communicate with: 128 RT3s by cable 128 RT3s by wireless
RT3 Field controller		Max. 256 units can communicate with F3: 128 by cable 128 by wireless
SQ3 Firing module		Max. 4,096 units can communicate with the RT3s by cable (two-wire) 2,048 by cable 2,048 by wireless

4,096 SQ3 x 32 cues each = **131,072 CUES**

a grand total of 4,096 SQ3 firing modules. Each firing module has 32 firing outputs, with a total capacity of 131,072 cues!

Such a large number of cues require an elevated data exchange speed between all of the hardware units connected. The timing of these various operations essentially become fundamental and needs to be measurable. The firing system itself is required to perform numerous operations during setup and the execution of a show. These operations include:

- Transferring the show program to each single SQ3 microprocessor.
- Performing comprehensive diagnostics (“Builder”).
- Arming and starting the show.
- Providing access to advanced functions during the show as necessary.

The effectiveness of hierarchical parallelism becomes especially clear in this context, and we believe you’ll agree that the response time (listed in Table 2) is very is very impressive. In short, to complete the transfer of the show from the remote controller to all 4,096 microprocessors on the individual firing modules takes less than 3 minutes.

In detail:

Table 2 – Times for show transfer

Checking SQ3s that require programming	5 sec
Program transfer from F3 to 256 RT3 field controllers	Max. 96 sec
Program transfer from 256 RT3s to 4,096 SQ3 firing modules	Max. 64 sec

Maximum time for complete
program transfer for 131,072 cues
165 sec = less than 3 minutes

→

For the purpose of diagnostics, a function known as "Builder" has been introduced. Simply put, "Builder" performs a scan of the field to identify all connected hardware units and takes a kind of electronic "photograph" of them that is saved into the internal memory of the remote controller. The actual situation in the field is thus "memorized" in this way and is then compared to the show's previously transferred program to produce a detailed report. In view of the volume of data for collection in this phase, we think you'll agree again that the speed of this operation is impressive: 10,000 cues can be processed in under two minutes.

In particular:

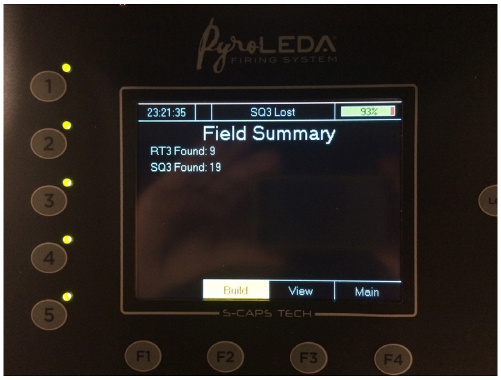
Table 3 – Times for "Builder" diagnostics

Identify all connected RT3s (256)	10 sec
Identify SQ3s (4,096)	Max. 64 sec
Data collection from all RT3s (256)	Max. 512 sec
Data collection from all RT3s (20)	Max. 40 sec

Maximum time for Builder completion
for 10,000 cues
114 sec = less than 2 minutes

Maximum time for Builder completion
for 131,072 cues
586 sec = less than 10 minutes

Once the "Builder" scan is complete, and a detailed report from the units connected in the field is created, a rapid and intuitive interface is required. This interface allows the operator to better understand the data received so they can respond quickly. As you can see (in Figure 3 and Figure 4) an operator can choose between different screen types to view the data. The "field summary" shows the number of hardware units detected. The "tree view" screen allows for individual identification of hardware units by ID number. For increased visibility, any deviation from the show program is marked by colored pins.



RT3 Found: 9
SQ3 Found: 19

Figure 3 - Field Summary

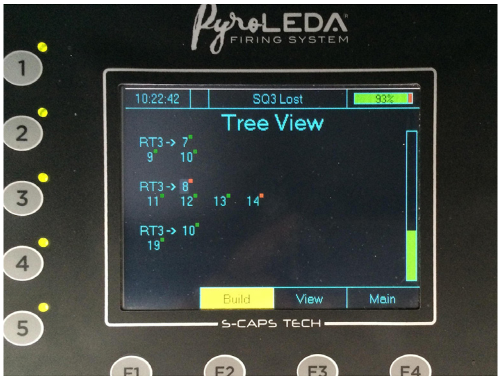


Figure 4 - Tree View

The main deviations that can be detected during this phase are:

- Missing hardware units
- Possible communication problems
- Insufficient available energy
- Igniter circuits.

For easier identification, each problem type is marked by a different color.

Individual deviations can then be verified by selecting the detailed data lists for individual hardware units.

PyroLEDA® FIRING SYSTEM

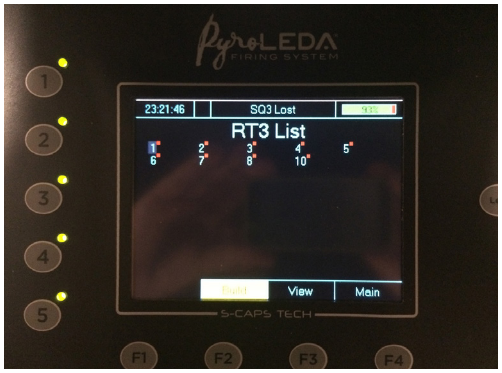


Figure 5 - RT3 List

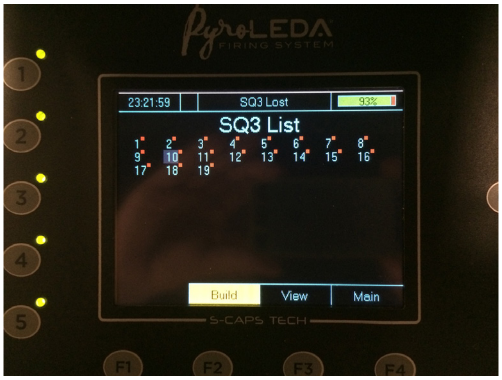


Figure 6 - SQ3 List

The final stage involves data for individual SQ3s (see Figure 7). Data available for verification includes specific ID, Show ID, status, power and a detailed list of igniter connections.

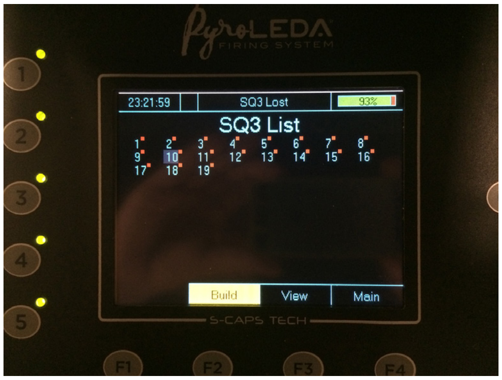


Figure 7 S- Q3 Info

As mentioned earlier scan results from Builder are "memorized." This means that the saved file can be reopened and new checks can be made without having to perform another full scan. The remote controller is able to perform a new check for comparison with the saved Builder file, and if any new deviations are detected, these issues will be highlighted. This option saves a great deal of time. In addition, a series of local tests in reverse order (SQ3 > RT3 > F3) can be performed during set-up to reduce error margins in the overall Builder scan.

The final operations performed before a display involves arming and starting the show. Completion of these operations take no more than a few seconds.

Table 4 – Times for arming and firing

Arming time	Max. 10-sec
Shooting operations	Instantaneously

Finally, a series of advanced functions can be accessed in real time during the show. These include:

- firing single manual cues or sequences of timed cues (including in overlap).
- activation or deactivation of groups or pre-set filters.
- disabling individual RT3s.
- time stretch.
- inserting a time offset in the presence of a TimeCode.

"HYBRID" COMMUNICATION SYSTEM

The high-speed data exchange between hardware units in the SuperMaster version of the PyroLEDA® system is not just a product of the hierarchical parallelism just outlined, but also results from the optimization of the system's communication vectors. Here is where we introduce the second important element of the system: The "Hybrid" communication system. This system is something we feel represents an entirely new feature not available in any other firing system. As different situations in the field create diverse requirements, two distinct bus types have been selected for the system to work in tandem. This selection was designed to allow operators to meet each different topological and regulatory requirement they have to face.

The first level concerns communication between the remote controller and the field controllers (which presents multiple requirements and demands a greater bandwidth for data exchange). Here an RS484 (by cable or radio) has been chosen as a suitably versatile solution.

The second level concerns communication between the field controllers and the firing modules. The most important consideration here is to have greater topological flexibility so a bus was chosen with smaller bandwidth (i.e., a FSK that can be transported by 0.5mm copper wire that is an established standard in pyrotechnics). This allows the operator greater freedom when positioning the firing modules in the field. If a galvanic length of 500m of wire (0.5mm) is available for connecting 16 SQ3s to each RT3, hardware units can be positioned topologically as required.

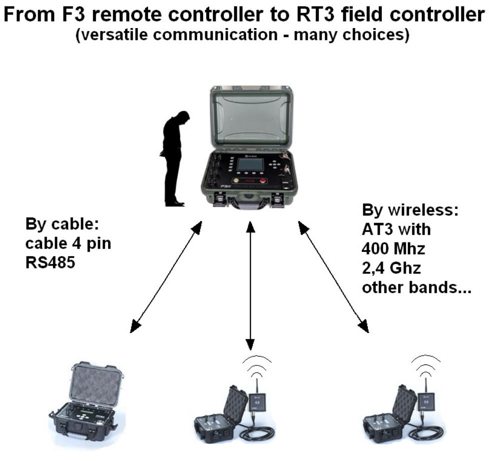

From F3 remote controller to RT3 field controller
(versatile communication - many choices)
By cable:
cable 4 pin
RS485
By wireless:
AT3 with
400 Mhz
2,4 Ghz
other bands...

Figure 8 - F3 to RT3s

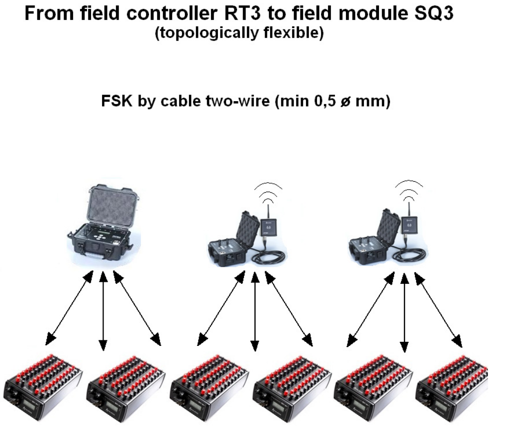

From field controller RT3 to field module SQ3
(topologically flexible)
FSK by cable two-wire (min 0,5 ø mm)

Figure 9 - RT3s to SQ3s

What are the advantages of having several available vectors of communication? That makes possible the use of a **flexible wireless system** for adaptability. The goal of most system designers working with wireless systems in recent years has been to propose as a universal solution effectively identifying the single best frequency to use for firing systems. The issue itself, however, is quite complicated, especially since radio is being used. National regulations impose requirements on certain frequencies and prohibit others entirely, and to add to the complexity, topographical factors must also be considered such as distances and physical obstacles. Certain environments are full of "sources of interference" (i.e., ports and towns). The bottom line being *no particular frequency is able to provide a solution valid for all situations*. In this case the Hybrid model gives the user a distinct advantage by making it possible to select an appropriate frequency for a given situation by simply changing the AT3 antenna module. Any available authorized frequency can be used. Protocols can be developed for radio broadcast modules or with hops. Currently, antenna modules are available with protocols implemented for 400 MHz and 2.4 GHz (different power levels), but the AT3 antenna module has been deliberately separated from the RT3 by means of a 3m cable to create the possibility of moving the

→

antenna in a 6m radius to find the best position for reception and transmission.

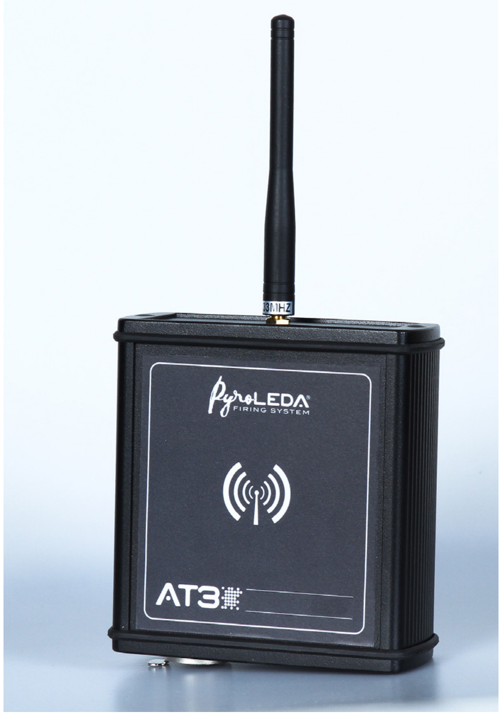


Figure 10 – AT3 antenna module

In addition to flexibility when choosing a frequency, the Hybrid communication system offers another unique advantage: **a backup system without modification to field layout**. The use of FSK for communication between field controllers and firing modules is made possible because each SQ3 decodes the TimeCode. This feature is in addition to the module's energy autonomy and its capacity for "memorizing" the part of the show in which it is involved. Therefore three characteristics – energy autonomy, memory and synchronization – make the SQ3 firing modules completely independent. As long as you can send the necessary commands directly to the firing modules (more precisely to their bus communication connectors), they will function even without contact using a remote controller (e.g., in case of emergency). This is a major advantage of the Hybrid model as it provides backup that is unmatched by any other communication system—a system that can potentially perform a display even without a remote control or any modification in the field. Maintaining the same hardware configuration and the same program, it can send appropriate commands directly from an RT3 field controller (by cable or wireless) to the other field controllers (or from any radio source) to arm, fire, synchronize, interrupt and end the show. If you choose to use an RT3 as backup in this way, the field controller also assumes the function of an equalizer to make sure that the FSK gets to the field modules at the correct volume.

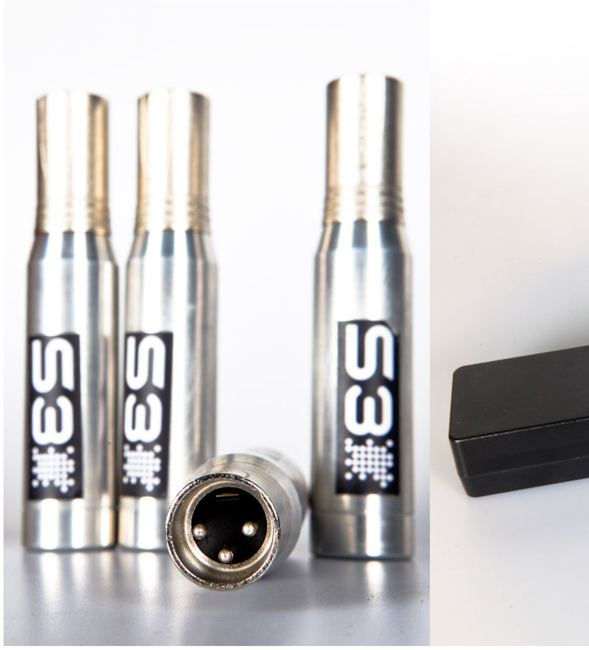


Figure 12 – Local S3 battery with charger and plugge

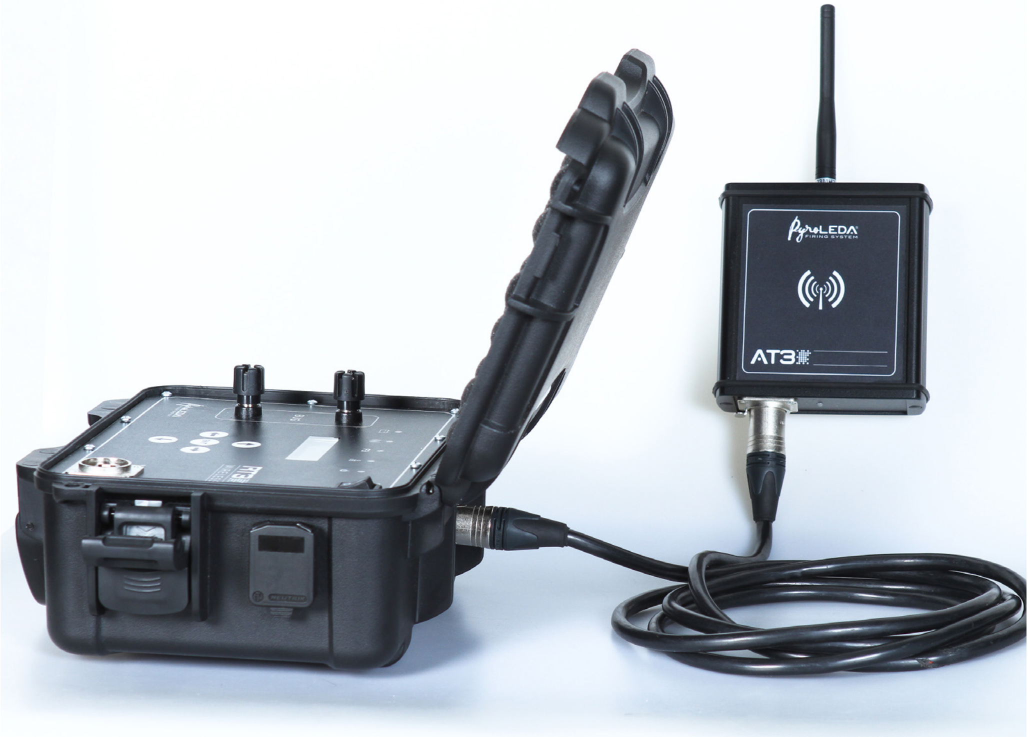


Figure 11 - RT3 with AT3

Finally, we would like to mention certain characteristics that are peculiar to the system: the energy autonomy of the SQ3 module (Note: each firing module has a local power supply external to the module itself) and the possibility of interaction with other devices such as solenoid valves and relays.

Local S3 batteries (lithium 3.6V) connected externally to the firing module represent an excellent solution that achieves a balance between battery performance and the work associated with planned maintenance. The concept for S3 originated from the need to compensate for the possibility of physical limits on energy

d in

distribution without requiring the operator to use a predetermined wiring configuration. The S3 batteries allows kilometers of wire (with an 0.5mm section) without impacting on the system's speed of function and thus it guarantees sufficient energy autonomy (up to 10 days in stand-by). The system's intrinsic safety is even maintained when the batteries are plugged in because the module's internal physical limitations are active during tests (as it check lines) until the moment it is armed in readiness for a show. Batteries are interchangeable right up to the last minute and make planned maintenance easier because it is easier to handle small, 10 cm battery rather than an entire module. Energy autonomy is of long duration, too: 10 days of autonomy in stand-by mode.

It is important to highlight the ability of the PyroLEDA® system to interface with a variety of multimedia devices. As well as accepting various types of TimeCodes for synchronization, the SQ3s include enhancements clearly demonstrating the complexity of their design. Each SQ3 is equipped with 8 firing lines (25-32) with that have the following advanced electrical properties:

Max 60 V (DC) - @ 16 Amp (permanent) - @ 100 Amp (peak) – self-protected mode.

This means that each line can be programmed—for duration of impulse and number of activations—and can therefore be used to manage solenoid valves or relays connected directly to the module. In this way, a display can be integrated with other multimedia effects.

CONCLUSIONS

In conclusion, the new developments added to the PyroLEDA® SuperMaster—in particular the practical application of hierarchical parallelism and the Hybrid combination of communication vectors—provides an important edge over alternative systems because of the speed and versatility it has when communicating and because of the backup solutions it offers pyrotechnicians. When added to the system's pre-existing characteristics, the PyroLEDA® SuperMaster completely satisfy every important management requirement necessary for the large pyromusical and/or multimedia displays.

ACKNOWLEDGEMENTS

During the past 15 years we have gained a great deal of valuable experience designing electronic components for fireworks applications and the thousands of units we have produced. It is important to acknowledge the many practical suggestions and comments we have received from experienced users participating in important competitions worldwide, however. Without their suggestions improvement and enhance of our product would have been a much slower process. ■

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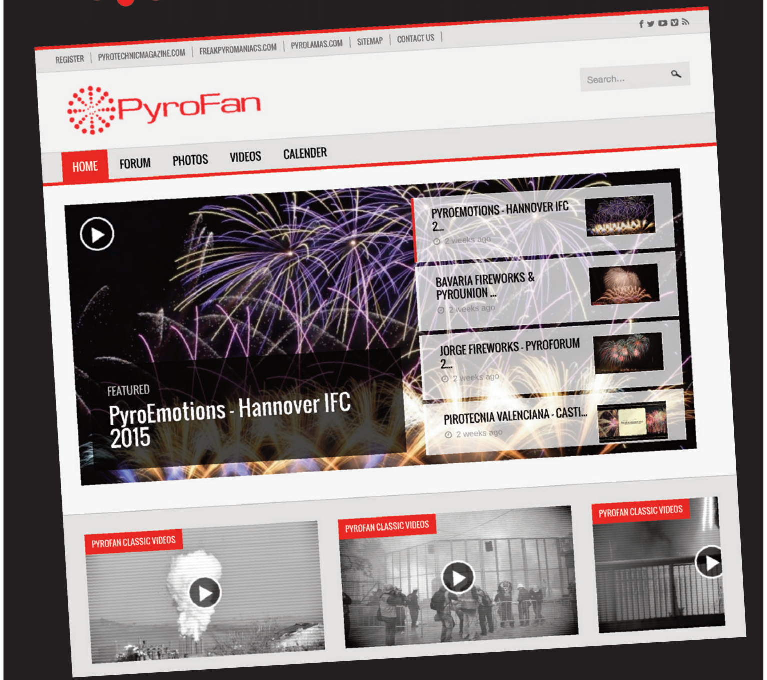
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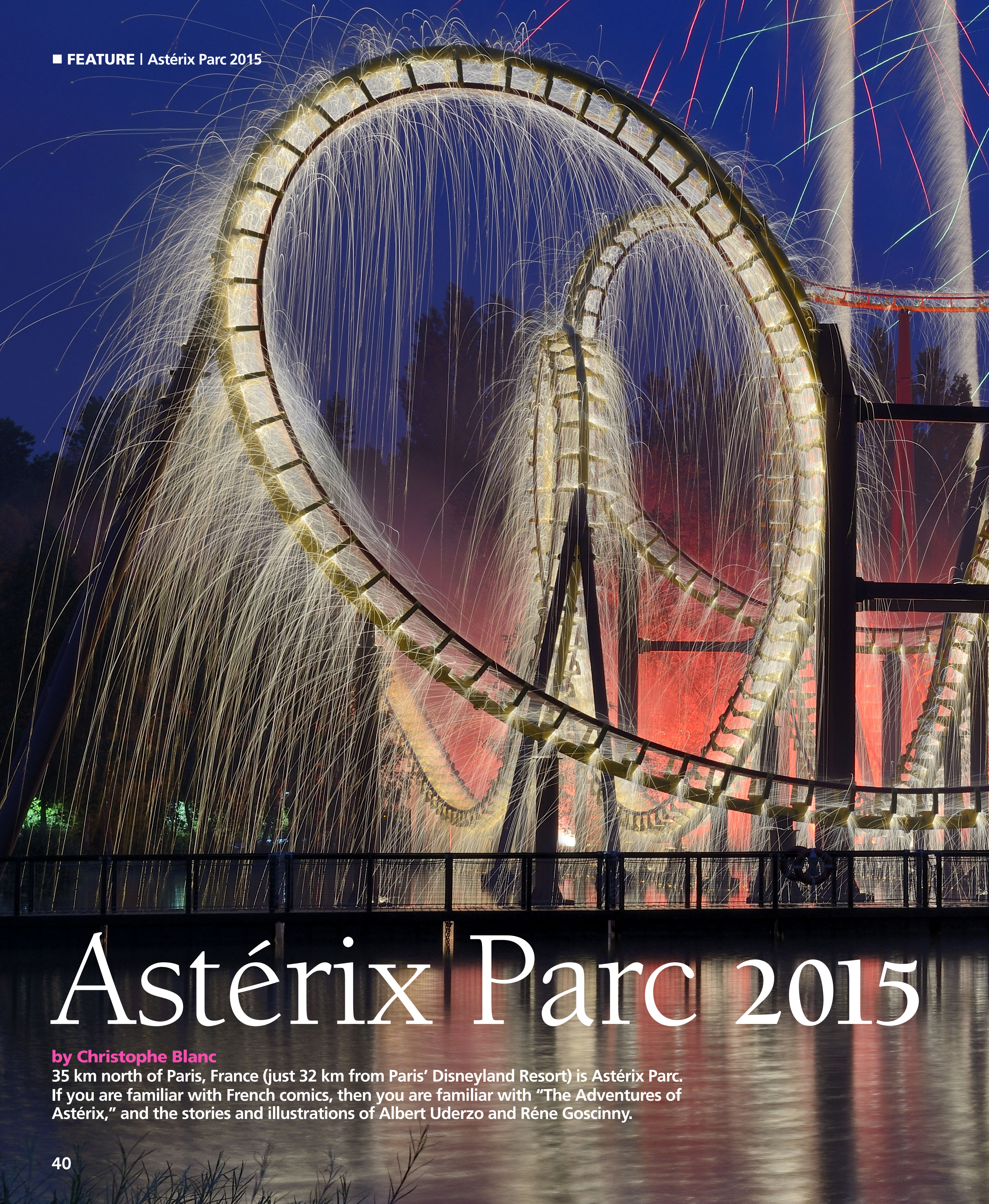
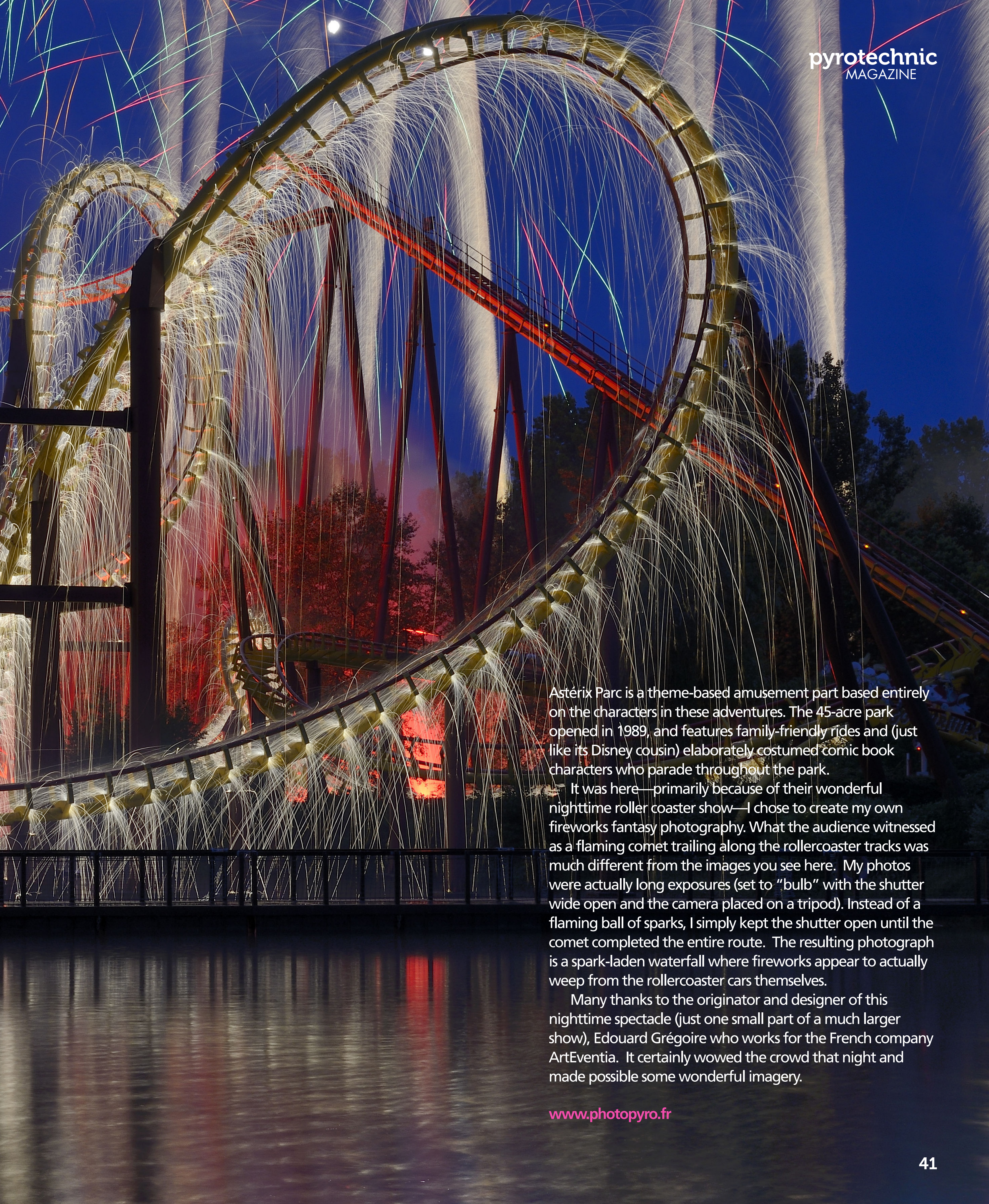


Astérix Parc 2015

by Christophe Blanc

35 km north of Paris, France (just 32 km from Paris' Disneyland Resort) is Astérix Parc. If you are familiar with French comics, then you are familiar with "The Adventures of Astérix," and the stories and illustrations of Albert Uderzo and Réne Goscinny.



Astérix Parc is a theme-based amusement part based entirely on the characters in these adventures. The 45-acre park opened in 1989, and features family-friendly rides and (just like its Disney cousin) elaborately costumed comic book characters who parade throughout the park.

It was here—primarily because of their wonderful nighttime roller coaster show—I chose to create my own fireworks fantasy photography. What the audience witnessed as a flaming comet trailing along the rollercoaster tracks was much different from the images you see here. My photos were actually long exposures (set to "bulb" with the shutter wide open and the camera placed on a tripod). Instead of a flaming ball of sparks, I simply kept the shutter open until the comet completed the entire route. The resulting photograph is a spark-laden waterfall where fireworks appear to actually weep from the rollercoaster cars themselves.

Many thanks to the originator and designer of this nighttime spectacle (just one small part of a much larger show), Edouard Grégoire who works for the French company ArtEventia. It certainly wowed the crowd that night and made possible some wonderful imagery.

www.photopyro.fr

KONNICHIWA FROM DÜSSELDORF GERMANY'S JAPAN-TAG 2015

Written by Roy and Yvette Houwers

"Tag" in German (pronounced "tahg"), means "day." For each of the last 13 years, "Japan-Tag" or "Japan Day" has been held in Düsseldorf, Germany. What? Why is there a Japan Day in Germany? Well, mainly because of the large Japanese population living there. →

KONNICHIWA FROM DÜSSELDORF GERMANY'S JAPAN-TAG 2015

During the past six decades the Japanese community located in Düsseldorf has grown substantially. Today there are an estimated 8,200 Japanese citizens living in and around the Düsseldorf area. And surprisingly enough, especially since they are living in a foreign country, the Japanese in Germany have established their own retail stores, banks, insurance companies and even have their own Chamber of Commerce. In addition to that, since 2014, Düsseldorf Airport offers direct flights to and from Tokyo via ANA (All Nippon Airways). But Düsseldorf isn't the only European city with a large Japanese population. In fact, it is the 3rd largest Japanese community in Europe (which gives you an idea of how many Japanese now live in Eurasia). It used to be number 1, but since the reunification of Germany, many Japanese business have moved to Berlin.

Since 2002, the Japanese community there (in complete cooperation with the city of Düsseldorf) established a feast day there they aptly call "Japan-Tag." This day is for the Japanese community what other festivals are for the local Germans. It is a day they get to celebrate their rich culture, their foods and everything else good about being Japanese. In fact, if you type "Japanese Capital on the Rhine" into your browser, then "Japan in Düsseldorf will pop up in your browser (www.japantag-duesseldorf-nrw.de/en/japan-in-duesseldorf). Please note this is no minor spectacle. On the average, over 500,000 people visit Düsseldorf to attend this celebration, and tens of thousands arrive fully costumed as Cosplay Art and Japanese Manga/Anime characters and figures.

Of course, this festival ends with an extraordinary Japanese fireworks display replete with a traditional peppering of the skies above the Rhine River with a "Golden Rain" finale of Kamuro 7-inch shells. All of this in the presence of a flotilla of dozens of beautifully decorated party ships and cruise ships completely illuminated with multicolored lights and Japanese lanterns.

The fireworks displays this year was created and choreographed by Hideki Kubota of Fireworks Japan "Hokuriku Kako" located in Wakamidori, Japan. (www.fireworks-japan.com). There with a staff of only 21 people they produce incredibly amazing fireworks productions for several major shows. This is done in collaboration with the German fireworks company "Nico Feuerwerke" under the direction of Martin Schmitz (www.nico-nle.de).

The overall show was structured in the following way: First the main theme is presented as conceived by the city of Düsseldorf and the Japanese Consulate in Düsseldorf. Next, Hideki Kubota of Fireworks Japan presents his company's theme.

The way it comes about is Hideki discusses the new effects with his team and then they figure out the most creative way it can be realized. They then create a virtual version of the show (complete with the newly proposed effects) and make modifications if necessary.

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One aspect of the show's preparation that very few are privy to see is the benediction ritual that Hideki goes through. He uses Sake (Japanese rice wine), straw and salt to accomplish this ritual and walks around the field systematically sprinkling all of it at different corners of the field as well as around the firing system. In this way, it is felt that the shooting place is blessed and everything will be safe and go smoothly, see videos 1 & 2.

The show's format consists of five scenes that have a total duration of about 25 minutes with a myriad of special effects presented. Since we have attended Japan-Tag we have seen card games, numbers, the letters "NRW Japan," umbrellas, footballs, Manga characters, Hello Kitty™, ninja dolls with swords, jellyfish, the @ symbol, cubes and flowers. Oh, and of course, the Golden Rain finale.

Japanese shows are predominantly peaceful shows that highlight specific effects to ensure they are clearly visible to the audience. We have traveled to Düsseldorf for 10 years now to watch Japan-Tag. Every year it seems to get better and is both an honor to attend, and an honor for us to help. Everyone there is friendly and we are always welcomed with open arms. It is a festival of congeniality and hospitality. We offer a sincere "Arigato" (thank you) to festival organizers for all the special memories it has given us. Japan-Tag has not only enriched the lives of the Japanese who live in this German city, but everyone and anyone who has ever attended this wonderful event. ■

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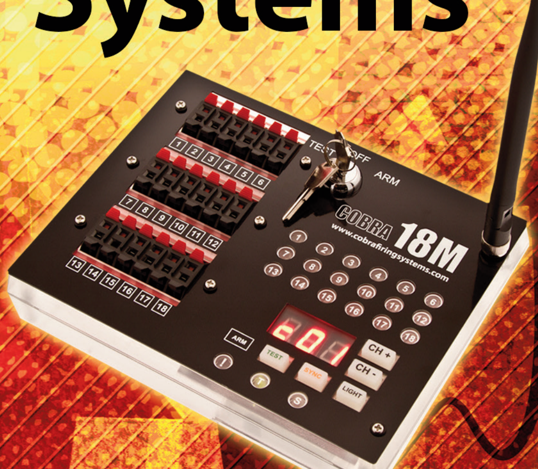

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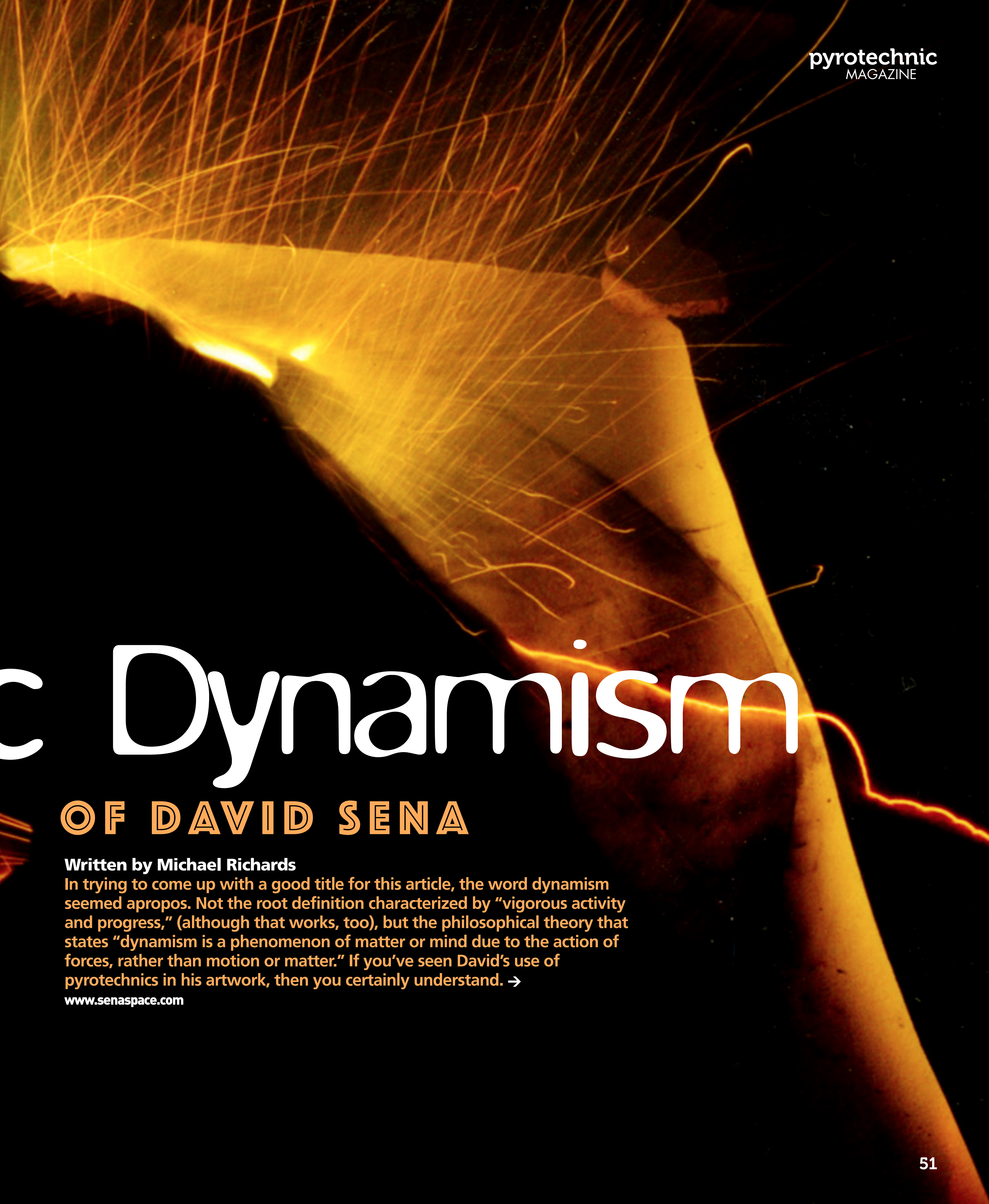

c Dynamism

OF DAVID SENA

Written by Michael Richards

In trying to come up with a good title for this article, the word dynamism seemed apropos. Not the root definition characterized by “vigorous activity and progress,” (although that works, too), but the philosophical theory that states “dynamism is a phenomenon of matter or mind due to the action of forces, rather than motion or matter.” If you’ve seen David’s use of pyrotechnics in his artwork, then you certainly understand. →

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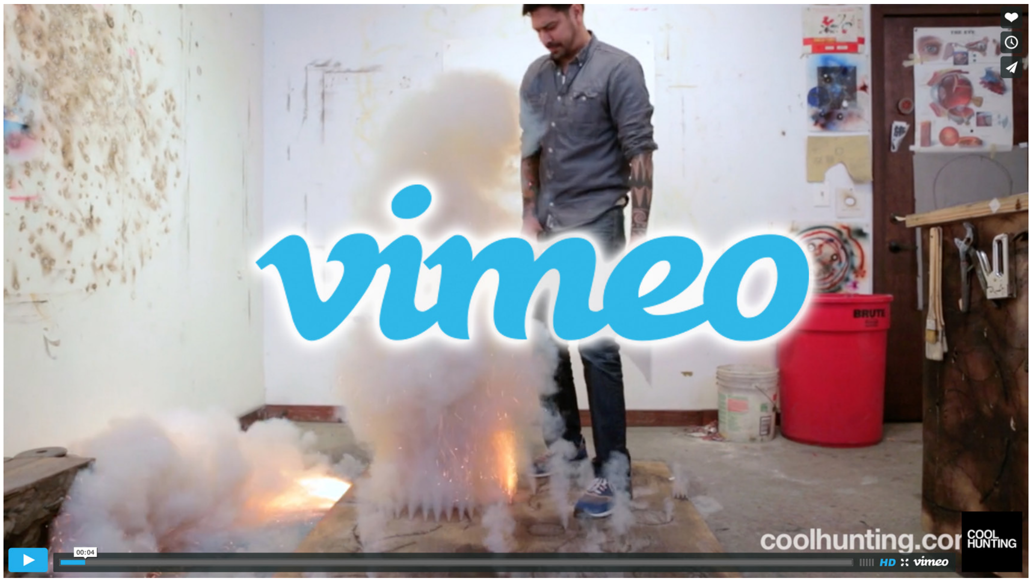


THE ARTISTIC DYNAMISM OF DAVID SENA

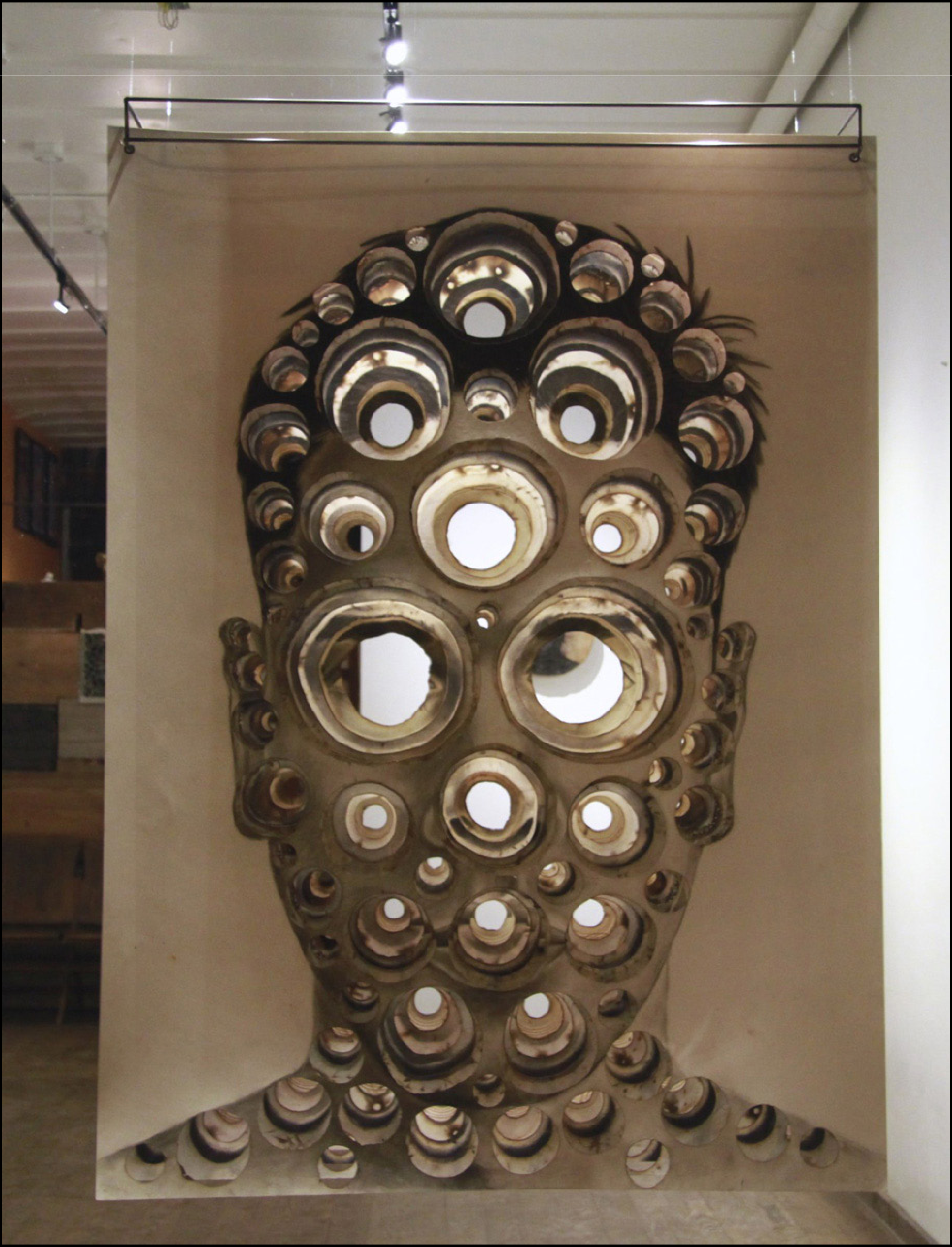
David Sena is a true artist. He's the kind of person steeped in his own imagination, and hell-bent on developing his own primal imaginative aesthetic. He regularly experiments with form, technique and a variety of media. And whether you know him for his indelible ink designs on human skin, or his controlled pyrotechnic conflagration, he is assuredly a dynamic artist whose fame is well deserved and germane.

What began as simply a good job for a young art student—creating drawings at a New York City tattoo parlor—quickly became a passion and eventually a career. Now after 18 years in the tattooing business (20 years making fire drawings), David Sena's fame as a tattooist, his requisite skills and his creativity have made possible a host of other projects that might not have been fathomable otherwise. David's "Fire Art" (don't dare call it "fire painting" because it's not) is just one more facet of David's multifaceted ability. His works contain a unique synergy to them that combine physical, tactile and spiritual attributes. There is a balance to it that is almost imperceptible, as if he is able to comb the chaos into straight lines.

David discussed his artwork with me by phone from his studio located at 229 Centre Street in downtown Manhattan (almost dead center between Greenwich Village, the East Village and Tribeca). It is really a dream location for any artist, and the Soho area (or Lower Manhattan as it is often called) is considered by many to be the artistic heartbeat of New York.

→

> ***"…I've gotten really good at burning circles and holes in paper. It is not simply using fireworks to make a mark on a page, it's using fire to actually take away from the page and having the void become the mark."***



"It takes the same degree of confidence to create something with fire as it does with ink because fire is usually considered a destructive force. There are similarities between the two, however, and like a direct stream of consciousness, you can't really erase either one."

***PM:* In preparation for this interview I read in some articles that you attended Cooper-Hewlett and other pieces that you attended Cooper-Union. Both schools have histories that are rather confusing—especially with their openings, closings and their renovations. What school DID you actually attend and where was it located?**

SENA: I went to The Cooper-Union, which is a college that Peter Cooper founded in 1859. I grew up in Texas, but spent my summers in New Mexico; then when I was 18 I got accepted into The Cooper-Union and left for New York.

***PM:* What kind of programs did they offer there? Was it a standard curriculum? Was it a degreed program or just artistic training?**

SENA: It was a degreed program. The school is actually 3 separate schools in one: art, architecture and engineering. And the school itself is dedicated to art and science. I attended the art school there and graduated with a Bachelor of Fine Arts.

***PM:* Would you recommend this path for other young artists looking to make their mark in the art world?**

SENA: Oh, certainly. Unfortunately, the school has changed in the past few years. The school used to be tuition free for over 150 years. That was the way Peter Cooper founded it. In the last two years they claim to have some problems with the endowment, so they have started to charge students tuition to attend there which has been quite controversial. That is particularly sad because it was a unique institution to that point. Everyone who attended there was there strictly on merit and it had nothing to do with race, or class or ability to pay. It gave a lot of people the ability to advance and excel in their chosen field.

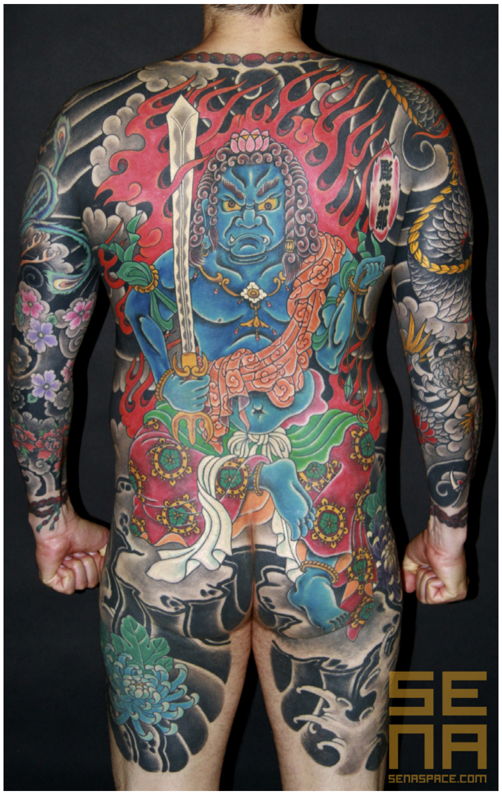
***PM:* What was your life like growing up in Texas? Was it Texas that helped turn you in an artist, or David Sena becoming an artist in spite of Texas?**

SENA: It think I was instilled with becoming an artist at a young age. I was always drawing and not paying much attention in school. But the Texas environment did help me. Since a great deal of my work has to do with cosmology and astronomy, growing up with those big Texas skies overhead and star-filled nights were formative. I was always interested in celestial bodies and the mechanics of the heavens. It was in New Mexico, though, at my parent's rural ranch that I first got involved with pyrotechnics. I would go there for the summer and fireworks were much more acceptable there than in Texas and since we were out in the middle of nowhere, you could do whatever you wanted to with fireworks. If you know the beauty of New Mexico, you know there are amazing skies out there as well.

***PM:* You delineate yourself as a tattoo artist AND a fine artist as if they differ in some way. In my mind, a fine artist is someone who exhibits great skill and creates art that can be appreciated solely for its imaginative content. Do you feel perhaps that you've successfully melded the two together and have finally brought tattoo art up to fine art status?**

SENA: I think so. I'm 40 now and I've been doing "Fire Drawings" for more than 20 years. I went to school for fine arts and so that was my foremost passion, and then fell into the tattoo industry while I was in school. Over the years, the two fields have coexisted very well and tattooing has given me the freedom to keep doing my own fine artwork. Often the two go hand in hand and occasionally even cross over into one another. I've always been interested in the two processes, however, because they are both very direct and a very physical means of making marks. Do I think the two have melded? I guess I would have to say yes, I would definitely consider tattooing to be a fine art these days.

***PM:*What made you delve into the tattoo world instead of the world of pencil, watercolor, acrylic or oil?**



SENA: It really was a random choice. I was going to art school and quite randomly I took a job at a tattoo studio one summer. I started using my drawing and illustration skills in that world. At the beginning I was only helping out and drawing things (it was a dream job, really). After being there for a couple of years, I decided I could learn how to tattoo. So, I taught myself how to tattoo, and lived and worked and learned in that environment, and it has been very good to me since.

"It takes the same degree of confidence to create something with fire as it does with ink because fire is usually considered a destructive force. There are similarities between the two, however, and like a direct stream of consciousness, you can't really erase either one."

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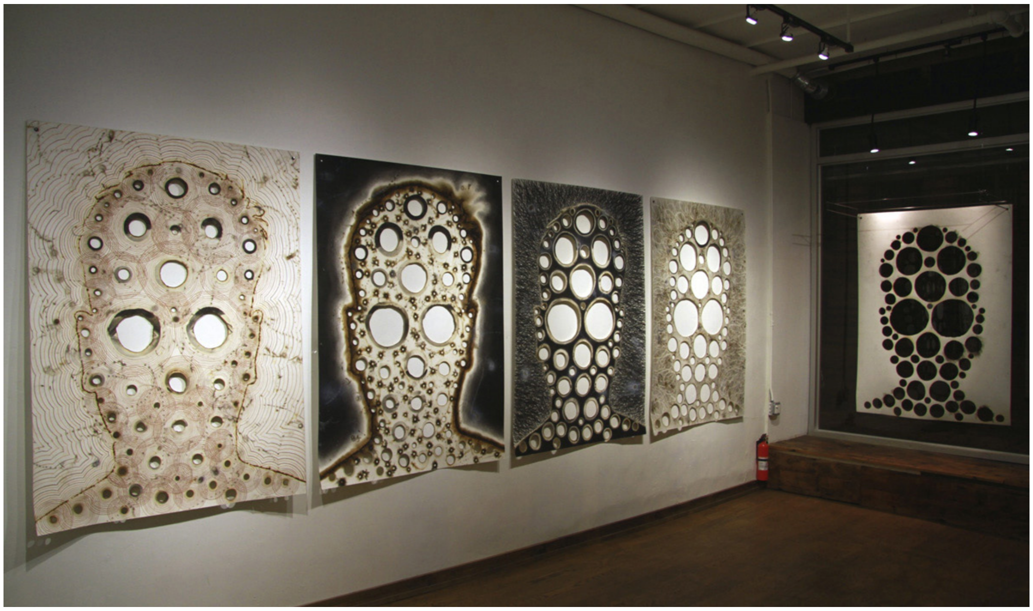
PM: ***Tattoos are permanent and fireworks are ephemeral. Do the difference between these two mediums somehow balance your artistic sensibility?***
SENA: I would say so, but I also think that what I do with fireworks is a very permanent thing. Burning marks in a surface is also something that cannot be erased. It is a very direct way of making a mark—something you're immediately committed to.

PM: ***One more question regarding tattoos before we move on to pyrotechnic art. I completely understand how you ink lines and ink solid colors on human skin, but it is your use of gradients that gives your work dimensionality. How do you achieve such wonderful gradients using a tattoo needle?***
SENA: Well, it really is about technique. Honestly, these days I can achieve more detail and shading and color with a tattoo machine than I can on paper. Tattooing surprisingly lends itself well to do a wide variety of colorful things. When most people think if tattooing, they consider the skin to be a canvas of sorts; at the same time, other people consider my pyrotechnic artwork to be "fire paintings" which they aren't because I don't use paint. I consider them to be drawings because they are exercises in mark making on paper. I also consider skin to be more like paper because it acts in a similar way. Watercolor paper, for example, absorbs the pigment and you can blend each color as it is absorbed. This is also the way skin works. It is the technique you use, and fine-tuning your skills and experience that gives you good gradients.

"In the past 5 years I think I've come to see tattooing as creating artwork for other people, but when I'm in my studio doing pyrotechnic work, I'm creating the work more for myself."



PM: ***The three things I've noticed about almost all of your artwork are its precision, its symmetry and its color balance. Is this something you learned over time, something innate or just one more reason your work has such a diverse audience?***
SENA: I think it is something I definitely learned over time, especially with tattooing. In art school it was more about science and how science—on a cosmic scale or even on an atomic scale—could be represented artistically. Tattooing is more illustrative; you have to deal with both color and line for every tattoo, so understanding color theory helps, but color balance is really something your develop a feel for with experience and use. In other words, you essentially learn what looks good and what translates well.

PM: ***How did you make that leap from the relatively safe world of tattooing to the far less controllable world of explosives and smoke?***
SENA: The pyrotechnic drawings actually came first. It was back when I was in art school during my sophomore year and I was given the time to explore and discover what I wanted to do artistically. I felt that the traditional materials—pencil, charcoal, and ink—weren't giving me the kind of marks I was looking for. Then I had this idea (like I said, having grown up using fireworks): What if I used them for my artwork? I remembered back how fireworks would leave burn marks and colored splotches on concrete and wooden surfaces after you lit them. What if I got a piece of paper and set off the fireworks on the paper itself? So I immediately went to China Town and bought some firecrackers and came back to my art studio to try them out. Right away I knew that that was what I was looking for. Since then, it has been all about refining and developing the techniques I use to create artwork using these types of combustible materials.

PM: ***Were you influenced at all by any other artists who have delved into this area of art? People like Cai Guo-Qiang, the renowned artist from China or Rosemarie Fiore in the U.S.?***
SENA: I wasn't really influenced by them because I hadn't seen any of their work. You have to realize that this was a long time ago and I was only about 19 or 20 years old. I remember seeing one show (I don't remember who the artist was) at a gallery in Soho and the artist had used candle soot to draw and create images. It was similar to a self-portrait I had done in college where you create a grid and assign lighter and darker values to each square. I achieved my portrait by using a butane lighter and holding it briefly in areas I wanted light and longer in areas I wanted darker. Doing that piece was

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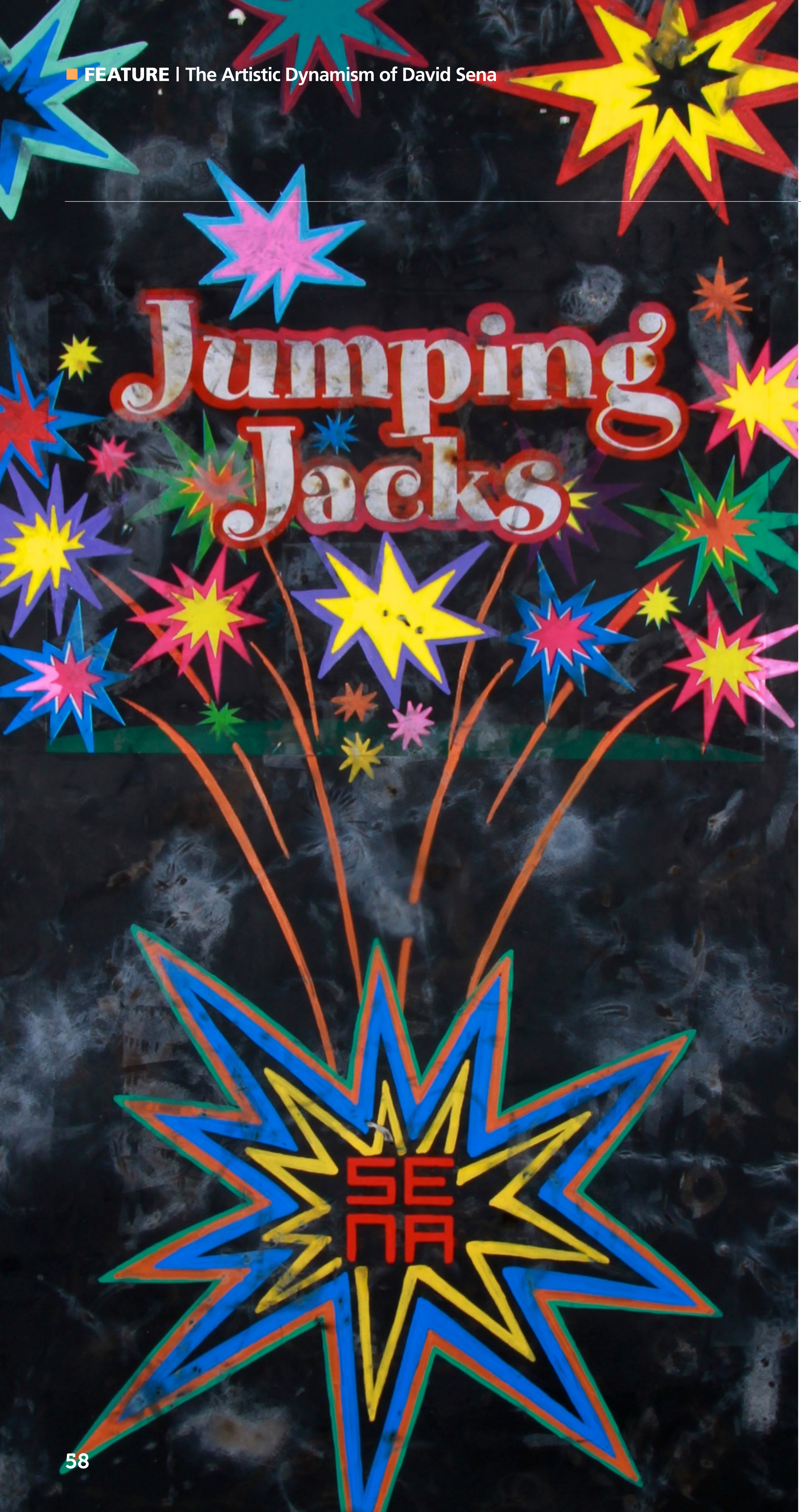


really the beginning of what I do now. It was the year after I had completed that portrait that I decided that fireworks would really be the way to go.

PM: ***Much of the work you do appears to have spiritual undertones to it. The faces, symbols and structure of your work—in both your tattoos and pyrotechnic artistry—appear to have an undercurrent of spirituality. Is this intentional on our part? And do you think this is what draws people to your artwork? Not just its color and line, but the "je ne sais quoi" they like but somehow eludes characterization?***
SENA: Tattooing is much more specific. It is objective and illustrative and has its roots in a variety of cultures. Different groups of people like the Japanese and the Polynesians and the Aztecs had cultural uses and reasons for tattooing. With the drawings I make, it is much more about creativity. That in and of itself is a spiritual experience. I think being in tune with your creative mind is always a spiritual experience. I look at my work as abstract and open to interpretation: a kind of sublime representation of our physical world.

PM: ***At the same time, your work seems very physical and tactile. Is that an extension of who you are as a person and as an artist? Have you always been a tactile person?***
SENA: Yes, I think so. When I was in art school I wasn't really concerned with learning graphic design or computers. Back in the early 90s computers were just starting to be considered an important tool for design work. For me, working on a computer to create a visual image felt very disconnected. What I enjoyed was working on a physical substance. Drawing, for example, is essentially an object art: the paper becomes an object itself, not just the image that is on it. Working with my hands and being involved in the physical process has always been very important, so I shied

> *"…if you're going to do what you're going to do, then do it and find a way to make it happen."*

away from the electronic world. As for the work I create with fire, I've gotten really good at burning circles and holes in paper. It is not simply using fireworks to make a mark on a page, it's using fire to actually take away from the page and having the void become the mark.

PM: ***Ironically, you seem to want to control the uncontrollable and make fire, explosions and smoke conform to your personalized design visualization. Does this always work or do the flames and combustibles oftentimes have a mind of their own?***
SENA: It is about both of those ideas: it is about control over substance to create what I want, and also about succumbing to the chaotic forces that create the marks with power that isn't under your control and you can't predict. What you're trying to do is harness the randomness of the fireworks and use that to your advantage. I appreciate both those aspects of the medium. Obviously, my work is very process-oriented, and I'm constantly discovering new processes I can utilize to create new compositions. It is a continual learning process, really. For example, different fireworks make different kinds of marks on paper, but putting them in different conditions make them behave differently. By using different papers, you will also get radically different results. There are an endless number of variables, and an endless supply of potential energy. In the past my work was very monochromatic because it simply involved burning paper. The about 8 years ago I started experimenting with color using colored smoke. The problem for me was that as soon as I introduced color people started considering them paintings, which they aren't. But regardless, it opened up an entirely new facet of work for me.

PM: ***Is it your need to constrain these forces that excites you artistically? Or is it the imprecision and accidental creation that appeals to you more?***
SENA: I think it starts with the accidental—that's the root of it—but then I take that force and harness it and work with it until I can use it somehow to change it into whatever it is I'm trying to create.

PM: ***The one thing pyrotechnicians stress every year—especially in the U.S.—is the need for safety when handling fireworks. I was very glad to see you donning safety glasses, gloves and using pliers to handle firecrackers. Have you always been this careful? Have there been any close calls or mishaps?***
SENA: I've always been careful and tried to be aware of safety issues involved with fireworks. In looking back, I've always had a fascination with fire, even as a child (which was frowned upon and I was sometimes disciplined for). In a sense, I think I always understood the destructive force of fire. Even though I did decide to play with it anyway, I tried to maintain a certain amount of control over it. Luckily, I was always able to do that. Back in college, the only place I had to do this kind of work was in a high ventilation room where the other students would do things like welding or use spray paint. The room had a powerful exhaust system designed to pull the toxic fumes right out. That was where I did my first experiments with fireworks art. The day after one of my first projects, one of the school's technicians asked me if I heard about the fire previous night in the high ventilation room. Right away

→

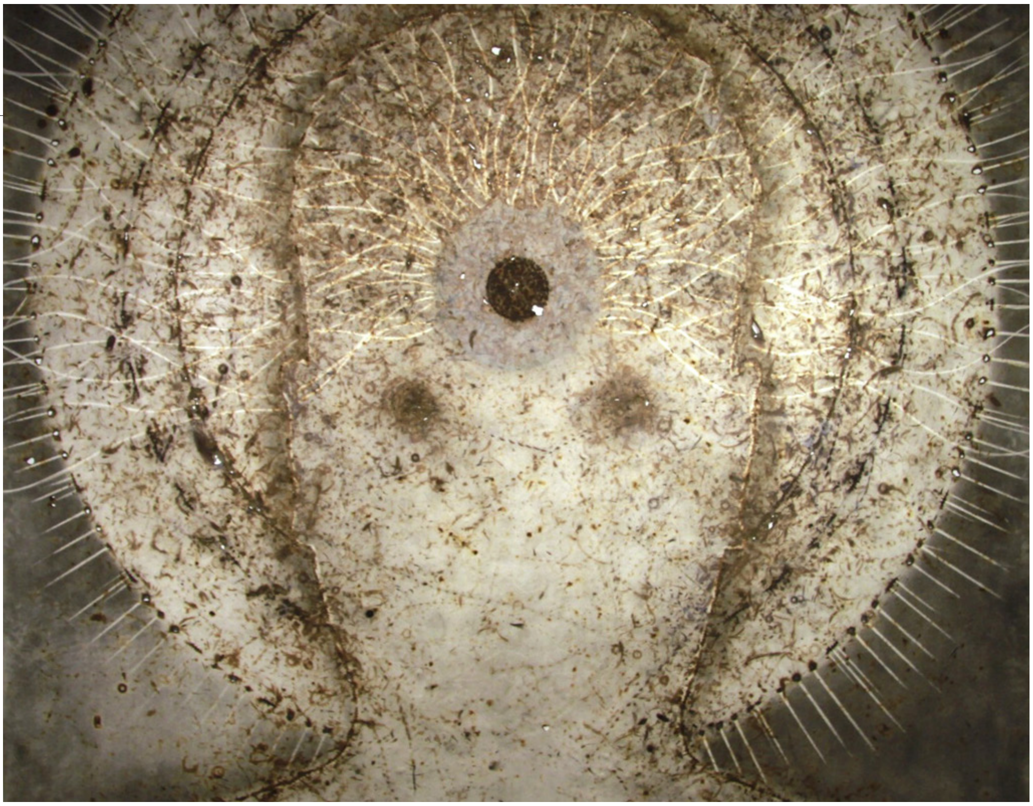
my heart sank and I thought I had caused some huge, destructive fire at my school. As it turned out, there was just some debris that sparks or hot ash had started smoldering and someone smelled the smoke and went in there and put it out. That accident turned out to be a blessing, really, because I was paranoid after that about safety and have been extremely careful ever since.

"…if you're going to do what you're going to do, then do it and find a way to make it happen."

PM: Any problems getting fireworks to do your work since you're in a state that almost totally restricts their transport and use?

SENA: In some ways it's difficult, of course. But I've been able to order some of what I need online, and then sometimes I have to travel to Pennsylvania or Connecticut to get whatever fireworks I need. Ironically, you can order all the materials and chemicals to make fireworks and have them mailed to you in New York, you just can't buy the fireworks themselves. It's not as difficult for me, I guess, because I use is often considered "lower tier" fireworks—mostly small firecrackers and colored smoke bombs. Fortunately, most of those are readily available. It did take me a long time to get comfortable working with this medium in studio spaces I had available to work. I've always been paranoid that something could go wrong, or that the authorities would be displeased and interfere with my work somehow. But that's part of the whole thing: if you're going to do what you're going to do, then do it and find a way to make it happen.

"…I've gotten really good at burning circles and holes in paper. It is not simply using fireworks to make a mark on a page, it's using fire to actually take away from the page and having the void become the mark."



"In the past 5 years I think I've come to see tattooing as creating artwork for other people, but when I'm in my studio doing pyrotechnic work, I'm creating the work more for myself."

PM: OK, you've essentially mastered the art of tattooing and have created exquisite fireworks art on paper. What is your current life plan? Are you going to continue perfecting and experimenting in this genre, or are you planning a new direction for yourself?

SENA: There are always new things. I'm going to definitely continue tattooing because that is a huge part of my life and it has enabled me to travel the world and meet some amazing people. It has also provided me with great opportunity and exposure. For me, the most important thing is to keep creating the work. Unfortunately, I haven't had much time to do that this year because I just opened up my own tattoo studio and art gallery and that has occupied most of my time. Obviously, it would be nice one day to focus more on my personal artwork rather than tattooing, but economically, that's just not possible right now. I feel good about everything, though, and feel certain that new opportunities are on the horizon.

PM: Last question: I couldn't help but notice you had a great many tattoos on your arms and at least one visible tattoo on your chest. Who do YOU allow to work on you? I mean, who does David Sena trust to do HIS tattoos?

SENA: Mostly people I've worked with and people I've become friends with. Also, tattoo artists that I've seen and I've sought out. A lot of it comes from traveling. I get new tattoos wherever I go sometimes. Essentially, you start becoming a collector of different people's work.

PM: So, some people collect charms or souvenirs when they travel, but you collect tattoos?

SENA: Yeah, it can become that way. Some people work with one tattoo artist their entire life, or they become a collector of different artists all over. It becomes a cool way to collect work, really, on your skin. ■

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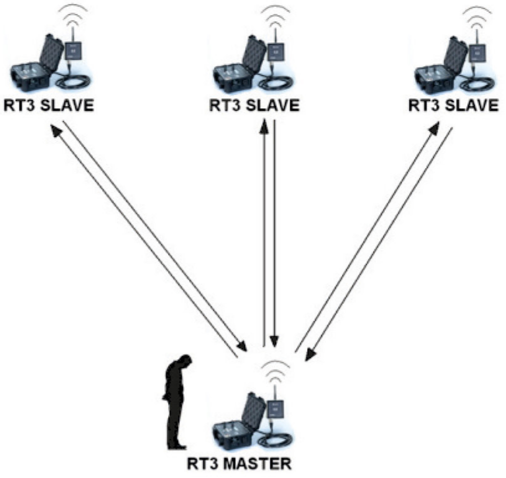

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THE SEASON
is about to start

Written by Nick van der Veen

Here in the Netherlands when summer holidays are over and people begin going back to work or school, fireworks importers and the companies that sell fireworks start preparing for the fireworks season to begin. Initially they host fireworks sample shows for the shop owners and consumers, then arrange production in China to be pushed to its limit to fulfill our seemingly insatiable pyrotechnic lust. →

Unfortunately, it's not all happiness and comets here as our brightly colored fireworks meet the horizon. An ever-increasing negative media blitz generally precedes our annual gunpowder-driven pyrofests. But critically analyzing our behavior and the resultant affects on our communities isn't always a bad thing. In essence, the ability to examine what we do and why we do it is what defines us as responsible human beings. The process, though, is only helpful if arguments and solutions are rational and based on actual facts. This is where our noble intentions get lost somewhere. Most often the arguments against fireworks are neither rational nor truthful.

The following are the top two inflammatory issues propagated by the media regarding fireworks each year. These issues are annually dusted off, recharged with some new rhetoric and presented to the public as "new" concerns before the first fuse ever meets the flame:

ENVIRONMENTAL POLLUTION

Yes, lighting fireworks leaves chemical residues. No denying it. Anti-fireworks protestors however, boldly exaggerate the amount of residue that fireworks leave in its wake. First of all, the environmental footprint left by consumer fireworks in the Netherlands is hardly measurable. It's extremely marginal when compared to more serious matters like the air pollutants created by traffic, industrial smokestacks or the fact that the Netherlands has a fossil-fuel dependency that results in exceptionally high carbon emissions. One reason the environmental impact of fireworks is so miniscule is that its usage is so tightly restricted: fireworks here are only allowed between 6:00 PM on December 31st and 2:00 AM January 1st. Factually, whatever gasses or residual "fallback" occur during New Year's Eve festivities is readily absorbed by nature within hours.

Facts aside, the media continually perpetuate their stories about the polluting power of fireworks, and how the metallic powders used (substances like lead for "crackling", as an example) are seriously bad for the environment. What they DON'T tell you, however, is most of the more dangerous chemicals comprising fireworks (again, like lead for "crackling") were replaced long ago by relatively harmless chemicals instead.

Truth be told, the fireworks industry is continuously researching ways to "clean up" the process by developing "recyclable" cake boxes and biodegradables. This also helps many companies during the assembly process as well.

FIREWORKS CAUSE A LOT OF DAMAGE

Just like any other product or material, fireworks used in the wrong way or unsafely can lead to disastrous results. The subtitle should actually be: "Stupid people do stupid things with fireworks". The question that really needs to be asked when "accidents" occur is: was it the result of the product, or a general lack of intellect. If you use consumer fireworks the way they are intended to be used, and take adequate safety precautions (e.g., like wearing safety goggles and keeping safe distances from ignited fireworks) the chances of accidents are minimalized.

What else can be done to limit the possibility of any potential damage? First, people need to understand that lighting fireworks is an intentional act that requires adequate preparation. We should be proactive and better educate fireworks enthusiasts. Instead of letting children figure out how to use fireworks completely on their own, parents should supervise them and instruct them about safe and correct usage. Next, law enforcement should make it very clear dangerous usage and "accidents" with fireworks that are the result of improper use and negligence will be prosecuted. Fines should be levied to cover any damages done to property. In addition, these fines will also help insure that people will be more cognizant of the rules that make fireworks safe and enjoyable for everyone.

Obviously, there is still a great deal of work to be done regarding fireworks. As fireworks enthusiasts (and professionals) we should definitely help educate anyone we see using fireworks—especially if we see them being used unsafely or incorrectly. Speaking up will help guarantee that we can continue to use them here. Also, if possible, ask people you know not to so readily accept the anti-firework hyperbole of the media. The facts don't support banning fireworks—in spite of the skewed stories and one-sided reporting seem to indicate.

In Holland the fireworks industry is facing a particularly odd backlash regarding a story that turned out to be entirely fabricated. It seems some unscrupulous person reported people's pets being killed by fireworks. Without checking the facts, the media pounced on this story and the public reaction was swift and horrific calling for a ban on ALL fireworks. Even though this story was entirely false (as were other similar stories that suddenly surfaced) the damage was already done and it was difficult to convince people that there was no truth to them. After all, headlines sell newspapers and make people watch the evening news; retractions are hidden on the back pages, or left entirely out of the next broadcast.

Regrettably, there are many falsely contrived negative stories still circulating about fireworks like these. They do a great deal of damage to our cause and solidify public opinion unfairly against us. It is up to all of us who truly love to use fireworks to set the record straight when we are able and not stand idly by and allow falsehood and propaganda to dictate governmental policy that may someday ban fireworks all together. ■

> “Stupid people do stupid things with fireworks”

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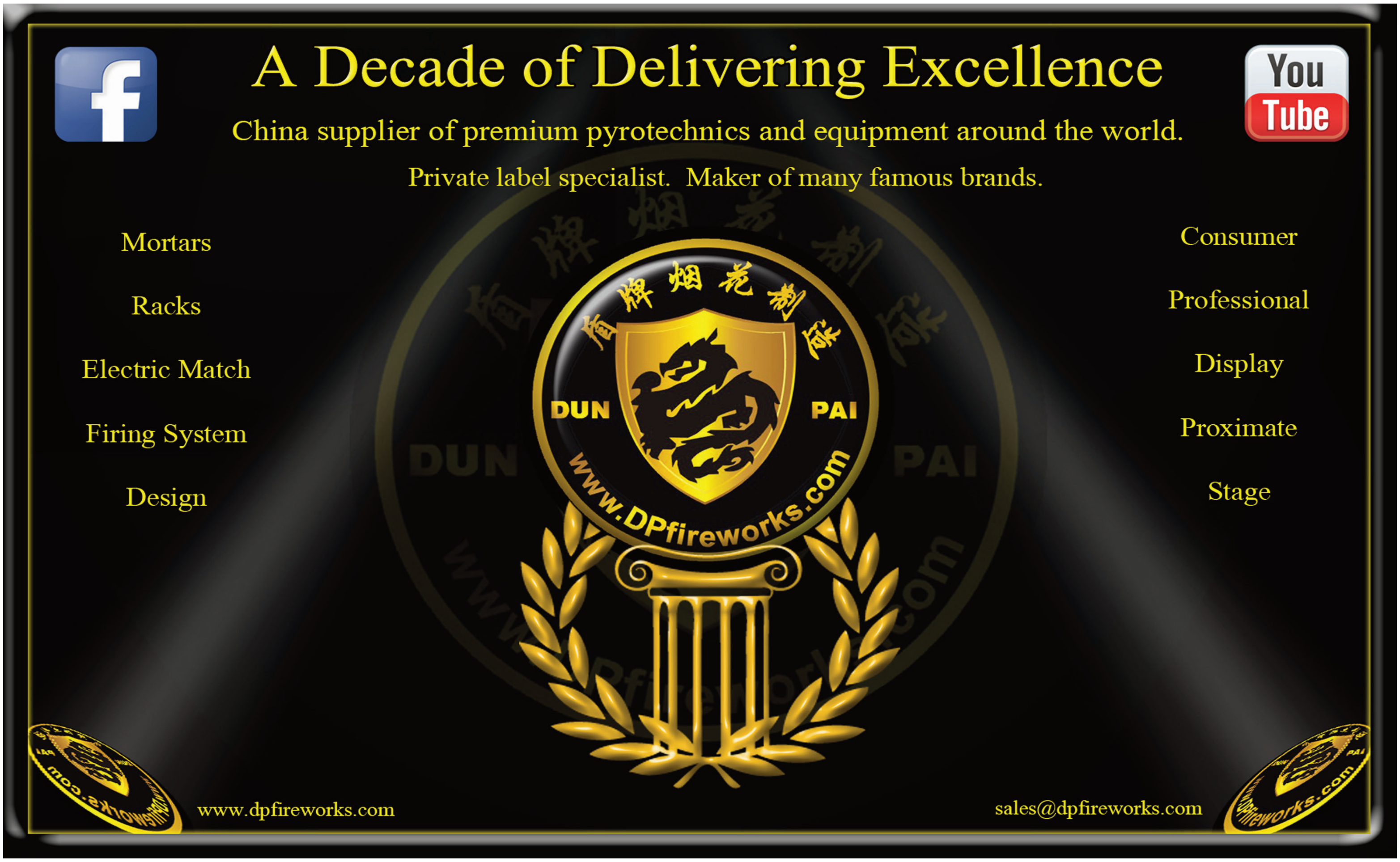

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This is RICASA

at the International Fireworks Competition Hannover 2015

Written by Tony Gemmink

Photos by Tobias Brevé and Tony Gemmink

This year the international fireworks competition held in Hannover celebrated its 25th anniversary. This festival is held in perhaps one of the most beautiful locations ever chosen for a fireworks competition - the Herrenhausen Gardens, located in Lower Saxony's capital of Hannover, Germany - and is one of the most famous fireworks festivals in all of Europe. →

This is
RICASA

For 25 years now many of the best pyrotechnic companies in the entire world have traveled to Hannover to compete against one another in this perfectly picturesque setting.

This was my very first time attending this particular competition. (I know, shame on me). But that's the problem I have being such a fireworks enthusiast: I want to see as many fireworks displays and competitions around the world as is humanly possible, but I also have a wife and children who need attention, so I need to make responsible decisions and consider their needs as well. When you have a family, the world can't always revolve around fireworks. Well, in a perfect world, maybe.

So, this year (I have to be picky about the competitions I see, remember) I traveled to Hannover to see the display by Pirotecnia Ricardo Caballer (Ricasa) from Valencia, Spain. And almost as soon as I arrived I knew I would have to return there again to see more competitions in the future. Honestly, the place is THAT stunningly scenic. The gardens are breathtakingly beautiful and the colorful flowers and statuary truly add an almost ethereal dimension—an ineffable beauty—to the nighttime displays.

Since this was my first visit, like I said, on Friday I didn't know exactly what to expect. Of course, I assumed Ricasa would go for the win (their team always brings their best products to competitions), but when you enter the amazing gardens for the first time,

Herrenhausen Gardens

The overall rules for the competition were as follow:

- Each show's duration was expected to be around 25 minutes in length.
- The first four minutes had to be displayed using music chosen by the host organization (This year's choice was the New World Symphony by Antonín Dvořák).
- After the first mandatory musical piece concluded, each company could then decide what other musical pieces to choreograph.
- Each competing company was also required to included a certain number of ground elements.
- The use of any kind of whistles or salutes was strictly prohibited.

the real winner is the splendor of the garden itself. Coming in a close second is the grandeur of thousands of single shot comets and mines placed seemingly everywhere! The fireworks-laden garden brought a smile to my face that didn't go away for almost two solid days. And this was just the single-shots! The second day of the setup was entirely different because that was when the big shells (8" max) were being placed and loaded. We did see some very nice set pieces, too, and wheels and long poles with single shots pointed in a variety of directions. If you've never seen a show by Ricasa, their use of single shots might confuse you. After you've seen the magic they create that way, though, you'll understand the perfection of their technique. →

This is
RICASA

This is RICASA

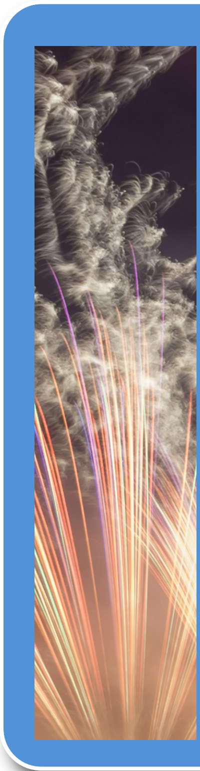
RICASA

It is hard to adequately describe just how much I love to watch fireworks displayed in concurrence with classical music. It seems to meld so much more perfectly to the brushstroke grace of pyrotechnic colors illuminating the nighttime sky (much more so than using top 40's tunes), and their combination seems to awaken an emotional power within me that always leaves me with an overwhelming sense of joy. What could easily be a crass mish-mash of colors and loud sounds manages to transcend itself to an almost mystical level as the fireworks perfectly intermix with each classical note and Zen-like pause.

Instead of me describing the highlights of the show I saw in Hannover, it would be much better for you to simply watch the videos for yourself so you can better understand their majesty.

In our next issue Tobias Brevé and Robin Harteveld will cover other facets of the competition since the competition was ongoing when this article was written.

We would like to thank Christina Fricke (Project Leader) and Nick Edgington (Rohr Feuerwerk) for their help and for providing information for this article.



As you might expect, the music used during this competition was also wonderful. The following is the music selected by Ricasa for use in their Pyromusical:

- New World Symphony by Antonín Dvořák
- Por Ti Volare by Andrea Bocelli
- Alice in Wonderland by Danny Elfman
- Game of Thrones by Ramin Djawadi
- Symphony No.5 by Beethoven
- Entre dos Aquas by Paco de Lucia
- Lord of the Dance by Ronah Hardiman
- Four Seasons by Vivaldi
- Dream Chasers by Future World Music

RICASA

Technical facts regarding this show:

- 5885 Cue's
- 669 (Multishot) candles
- 6457 Single Shots and Special effects
- 1064 Shells
- 404 Pirodigital field modules
- 8190 Igniters
- Design of the show took 2 weeks to complete

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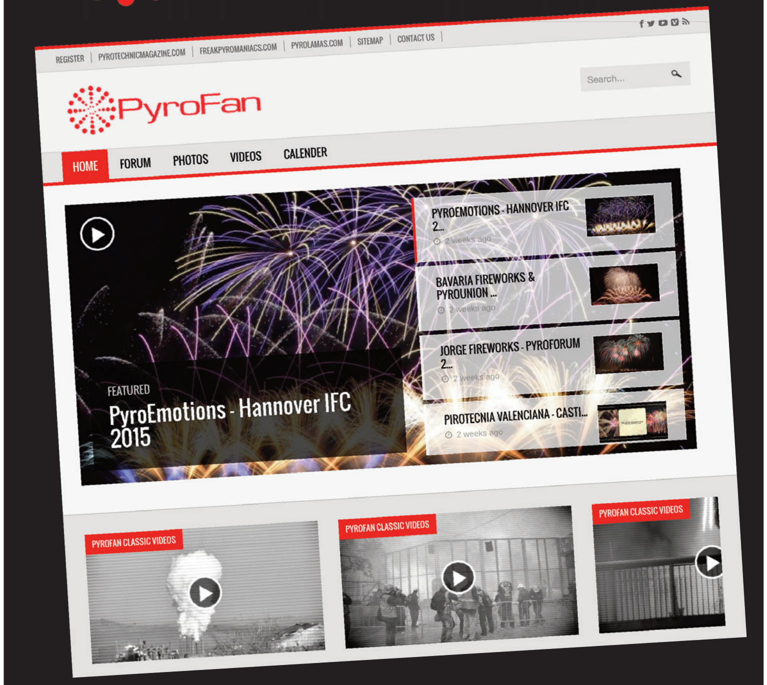

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+ much more

The Artistic Dynamism of David Sena
In trying to come up with a good title for this article, the word dynamism seemed apropos. Not the root definition characterized by "vigorous activity and progress,"...

Independence Day Fireworks in Goochland, USA
When either Memorial Day or Independence Day rolls around, I fervently search out the best possible fireworks shows to go to see in my area...

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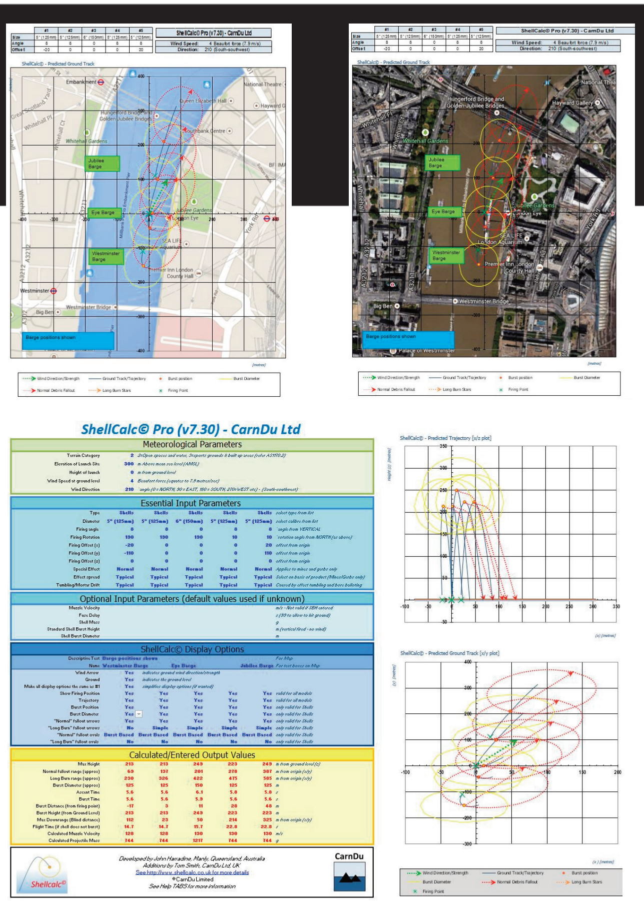

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Photo: © Carl Desjardins : Vulcan Fireworks award winning performance at "International des Feux Loto-Quebec, Montreal, Canada 2015."

TERMINOLO

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(ITALIAN TERMINOLOGY) PART T

Written by Marcel Hanse and Leendert van Buren →

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In part one of our series on Italian terminology we discussed the traditional multi-break shells. As we mentioned, these shells are most often used in southern Italy. In northern Italy, single effect shells are more common and used more frequently. Of course, they use single effect shells in the south, too, but multi-break shells are preferred—especially at the beginning of any show. It is common to see gold and silver shells used initially and then multi-break shells to complete the sequence. It is also quite common to see special constructions used during Italian displays, with shells increasing in caliber, sound intensity, and the number of reports used in conjunction with salutes fired. The Italians love lively effects: whistles, reports, flashes and salutes are very popular. Most often shells used to create these effects are spherical and cylindrical. Truth be told, many of these effects mimic Chinese shell designs and did not originate in Italy at all. Some Chinese effects like "crossettes" and the "Popping Flower " are frequent choices used by Italian pyrotechnicians.

A BRIEF EXPLANATION OF SOME ITALIAN SHELLS

Cylindrical shells (see all of the Italian shells listed with an °) are produced in standardized diameters of 65mm, 75mm and 100mm. They are the most common sizes manufactured in Italy, and equally popular in many other countries as well. Dependent on the caliber, these shells generally produce a bouquet of colored stars, followed by 5-9 reports (called "lampi"). They tend to be used during the beginning of each display or after the apertura (the opening), and are fired in sequences of 2 or 3 seconds apart to achieve a rhythm with the reports. Firing a series of these shells is called "sbracata".

Also part of daylight shows, "sbracatelle" are used. They are similar to lampi, but without the colored stars. For use as part of the finale, sbracatelle are chosen in calibers of between 100mm and 200mm. The 100mm shells are actually rather large, and are between 20cm to 25cm in length and contain 25" “rendini " per shell. Rendini are used during the beginning of the finale, and are comprised of cardboard cartridges filled with a nitrate based flash composition. On the front side there is pressed black powder, "polvera nera" that makes the delay. After the break ("pacca") of the shell, the "rendini" explodes quickly. This is done to create a "crescendo" of noise that continues to heighten using "rendini" and "colpicini" (small salutes) to build a rhythm. "Colpicini " (often made of plastic) have essentially the same effect as "rendini", but the sound is much louder. When the finale is almost finished the caliber of the cylindrical shells increases in size from 125mm to 150mm, and only contain larger caliber "colpicini."

During this "inferno," the last part of the finale is developed. This final section—usually fired in one salvo–generally includes more than 50 cylindrical shells that are predominantly 150mm or 200mm caliber in size. Of course, size of the shells used directly relate to the show’s overall budget. In the Italian language, this part of the fireworks display is "fuga" and in the Napolitan dialect, is referred to as "strenta.”

BOMBA A SPACCO E BOTTA°: These cylindrical shells are generally 65mm, 75mm, 100mm and 125mm caliber. They contain a bouquet with colored stars, followed by a solitary salute. With calibers of 150mm or larger, this kind of salute is fired separately and after a bouquet shell.

The salute itself is called "botta" because it is part of a bouquet shell (plural: "botti ") and when the salute is fired as a separate shell, it is called "colpo" (plural: "colpi”). When the salute is used as the bottom-shot in a multi-break shell, it is called a "controcolpo.”

BOMBA A SPACCO E FISHI°: This cylindrical shell is most often 65mm, 75mm or 100mm caliber in size. The shell has a bouquet with colored stars and includes whistle cartridges. These are frequently used during daylight displays.

BOMBA A FARFALLE°: This is usually a 65mm to 200mm cylindrical shell–a typical Italian effect–that is quite often imitated by manufacturers in many other countries. This shell has a rosette of thick silver tails, sometimes with and sometimes without a colored pistil.

The inserts are placed in 1, 2, or 3 layers inside the shell, depending on the caliber. 1st layer: 65mm up to100mm; 2nd layer: 125mm to 150mm; 3rd layer: 200mm. The inserts themselves have cardboard cartridges at the beginning with 2 holes and a fast fuse for gas emissions. It is critically important that the holes are the same size so a steady gas emission can be released simultaneously, otherwise they will start to spin or turn in the air. That would essentially ruin the effect, because it would distort the beautiful rosette (a round, stylized pyrotechnic flower). Companies like Ipon Pagano,

→

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Vaccalluzzo, Di Matteo, Vaini and Pannella are well versed in creating these types of perfect bomba a farfalle.

The large caliber farfalle shells of Carmelo Di Candia are exquisite in this category, too!

BOMBA A SERPENTELLI: This cylindrical shell produced in the following calibers: 65mm, 75mm, and 100 mm. Very similar to the Bomba a farfalle, the main difference is that the inserts have one opening on the front side. After ignition, the inserts start to turn around. Sometimes flash composition is added at the end of the cardboard cartridges.

After the silver-spinning effect, a salute follows. This effect is called "serpentelli con botta". Another associated effect used in this cylinder shell is called "serpentelli a girello". Unique to these, the cardboard cartridges have one opening at the bottom side and one opening on the topside (thus, openings at opposite sides). When both sides are ignited using a fast fuse ("stoppino"), the inserts begin spinning very fast. Sometimes flash powder is added so there is a noisy finish. These popular shells are used for both daylight and for evening displays.

BOMBA CON STELLE A BOTTA: This shell is generally produced in calibers ranging between 75mm and 100mm. The shell is filled with cardboard inserts installed within a ring. Each insert has one opening at the front side of the cardboard tube. The front side is filled with pressed black powder ("polvera near") for the delay. Behind this delay there is a layer of color composition, and within the backside is a load of flash powder. After initial ignition, these cartridges irradiate intensely bright colors (mostly green or red), and they finish with a loud salute. These, too, are used in both daylight and evening displays.

BOMBA A CANNOLI: Bomba a cannolis are a larger caliber cylindrical shell produced in the 125mm to 300mm range. This shell is named after the special stars that have been installed inside. The stars are carefully layered within the cylinders, and dependent on the caliber of the shell, can have anywhere between 2 to 5 layers of stars. The "cannoli" stars are really small cardboard tubes filled with a color composite that burns from both sides toward the middle. The color is usually very bright and the stars burn a long time—oftentimes all the way back to the ground. The effects of the stars differ based on what company makes them. Pannella, Di Candia, Scudo and Bruscella produce stars with long silver tails followed by awesomely intense color. Carmine Lieto produces a much different—and quite vivid—star that extinguish randomly at different times to create a twinkling effect.

When this type of shell is fired individually, it is called a "bomba piena." Sometimes it contains a salute for closure. When used as part of a multi-break shell it is called a "controbomba" (In the Napolitan dialect it is called a "cacciata"). Multi-break shells are usually at least 150mm, and contain "controbomba a stelle" (round stars) instead of the "cannoli" stars.

Note: although these shells are primarily cylindrical, they are produced as spherical shells as well. You see these fired in salvos during the "aperture," or to finish a display section at the end of the finale.

The Italians call this shell "bomba giapponesi." During the pre-finale these shells are also fired in salvos. This pre-finale is called "giapponesata." The most common effect used in these shells are: peony ("peonia") and/or chrysanthemums ("crisantemo"). When they change in color, they are called "crisantemo cambiamento" and if they contain a pistil, they are called "peonia con centro colorato."

Peonies with a double-pistil are rarely seen in Italy, but they are supposedly a common effect used in Japan. In the village of Siano, Italy, Luigi Di Matteo fired a double-pistil shell like this for the first time in 2013. It was an awesome shell that should probably be shot more often. Vaccalluzzo, Ugo Lieto, Giovanni Pannella, Gerardo Scudo and Luigi Di Matteo produce large caliber, high quality spherical shells which sometimes change color 3 times and often end with a farfalle pistil.

Here is a list of some of the most frequent effects used in Italy:

INTERMITTENTE BIANCO° - This is a "strobe" or "blinker" effect and is also produced in some cylindrical shells.
PIOGGIA BIANCA/ARGENTO° - This is the white rain effect. Some of the companies producing this effect in at the highest

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quality are: Carmelo Di Candia, brothers Ferraro, Catapano, Panzera and Michele Bruscella. The stars in this product contain a great deal of titanium and are of a special composition so the stars will create a fine white tail that won't dissipate quickly in the air. These shells are regularly used during the show's finale and are real crowd pleasers.

PIOGGIA SCOPPIETTANTE° - This is the crackling effect that is also used in the "peonia." The Italians version produces a high quality, loud crackling sound.

PIOGGIA LUCCIANTE° - This is a twinkling rain effect. This item contains stars often made in gold with an addition of red ("rosso") or green ("verde "). Gerardo Scudo uses this effect in many of his shows.

PIOGGIA ORO/NERA° - This is the "golden rain" or "willow effect" ("salice"). The stars in this are made of carbon with an addition of "ferro titanium." These stars generally shine brighter and have an intense twinkling effect ("oro chiaro"). This effect is also used to finish the first part of the show like the "pioggia bianca/argento" and sometimes to introduce a multi-break shell sequence.

PIOGGIA DI CARBONE° - The stars in this shell contain a very large amount of carbon "carbone"), and produce a very dense, dark gold spread in the sky ("oro scuro").
This effect isn't fired very often, but they are certainly something special to see when they are. Carmelo Di Candia fires many of these very high quality shells. Because the "Pioggia Oro/Nera" shines more brightly than the Pioggia Di Carbone it is a much more popular shell to fire.

CASCATA ORO/ARGENTO° - This is a golden or silver waterfall. Mostly produced in a cylindrical form, it has a little bursting charge ("spacco") so that the stars appear to be falling like a waterfall. A very popular effect is to have the golden waterfall change the color at the end to green or to a multicolor tip. Also popular the willow effect "salice" is often used as well. ■

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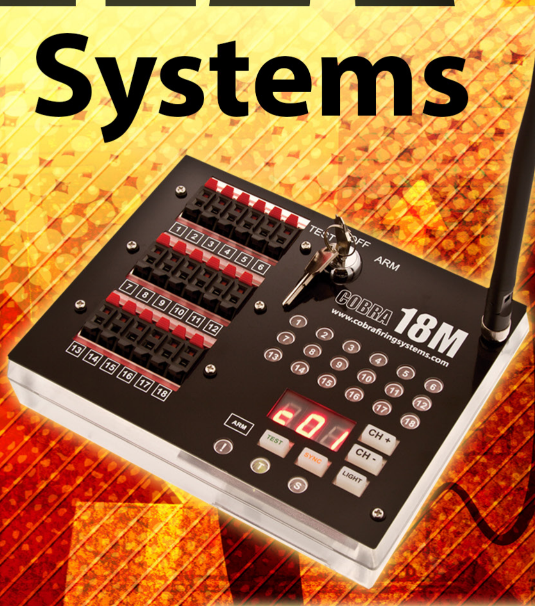

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CELEBRATIO

015

ON OF LIGHT

Written by Casey Durette and all Photos by Jenn Chan →

2015 CELEBRATION OF LIGHT

Jenn Chan's **facebook** page

It was late July and the air had a fragrant sweetness to it as I drove through downtown Vancouver, Canada. With colorful banners hanging from almost every post along the famous Burrard Bridge, it was clear that Vancouver was gearing up for their biggest summer event: The Honda Celebration of Light.

The Honda Celebration of Light actually began in the summer of 1990, although it was known back then as the "Symphony of Fire" instead. Today it is probably one of the best known and most widely anticipated fireworks displays in the Pacific Northwest. Boasting an amazing attendance of around 1.4 million people, the Honda Celebration of Light brings an estimated $37 Million annually into the local economy during this multi-day event. The event is touted as being the longest-running offshore fireworks competition in the world.

These massive displays are shot from large barges connected to one another offshore, and people watch the fireworks from English Bay beach, Stanley Park, and even from Cypress Mountain nearly 28 km away. Actually, any direction 360-degrees around the barges is a good place to view these wonderful displays. See video above.

The fact that this was the 25th Anniversary of this pyrotechnic competition made it especially exciting, and it promised to be one of its biggest competitions ever. All three competitors were powerhouses in the display industry: Lidu Fireworks (representing China), Group Vision Show (representing Brazil), and Archangel Fireworks (representing Canada). All three of these companies had competed here before and had either won the competition trophy outright, or had gained the undying respect of the crowd.

To simply say "crews often experience setup challenges" is to horrendously underexaggerate the complexities faced when setting up displays on barges in open water. Let's not forget that even though this is an inlet area of sorts, the Salish Sea in the Strait of Georgia is still connected to the Pacific Ocean. Just the constantly rocking of the barges themselves can be problematic enough, but couple that with ocean wind and intense rain and teams used to working only on dry land and you have a clearer picture of what the teams were dealing with. This year, Team Luidu's display setup was stymied for two days by intermittent rain and drizzle. Fortunately, the front moved eastward and was replaced by warm, beautiful weather that made setup much easier.

To really experience "The Honda Celebration of Light" in all it's splendor you have to walk around in the English Bay area before it begins. On show days (this year the show dates were July 25th, July 29th and August 1st) the city of Vancouver has an absolutely electric feel to it. Just the walk along the coastline from Sunset Beach to English Bay Beach is a wonderful experience.

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HONDA
CELEBRATION OF LIGHT

It is literally packed with vendors, concert stages sporting all styles of music and newly erected beer gardens.

Of course, there is the "VIP Lounge" area situated right beside the main performance stage, and tickets can be purchased before the festival. This is unrivaled seating, really (the absolute best) for anyone willing to pay who has a desire to have the ultimate view of the upcoming displays. Considering each ticket comes with the guarantee of excellent food (cooked right in front of you), cocktails and great service, the tickets are actually a fairly good value.

THE COMPETITION

As indicated before, "The Honda Celebration of Light" competition is divided into three separate nights. Each night a different company (representing a different country) performs a 25-minute fireworks display along with expertly choreographed music. The fireworks music is simulcast from a local radio station (LG104.3 FM) and can be heard in the air almost everywhere.

A panel of industry experts judges the overall competition, but several sponsors and a few celebrities are included as judges as well. They use the following criteria to judge the competition:

- Sizing of the Show: 10 Points
- Overall Design and Artistry: 30 Points
- Synchronization: 20 Points
- Originality of Effects: 15 Points
- Quality of Soundtrack: 15 Points
- Quality of Fireworks: 10 Points

Interestingly enough, if any team were to exhibit a lack of professionalism, do a sloppy installation job or disregard local public safety precautions, the "Technical Director" could shave up to five points off their final score. This is highly unlikely, though, because of the high caliber of the participants competing.

1ST NIGHT:
LIDU FIREWORKS/CHINA

On the first night, the team representing China, Team Lidu Fireworks , treated the audience to classic Chinese musical choreography filled with colorful displays boldly characteristic of Chinese fireworks pageantry (a style the audience has come to appreciate and expect). The show began with an assertive entrance of red horse tales, and calmly proceeded through six scenes of classical Chinese folk songs contrasted by contemporary Chinese pop music. Throughout their show, Team Lidu used an abundance of cakes to create some spectacular low-level displays. Ultimately, however, it was their high shell punctuation and cake work that ultimately wowed the crowd. Their use of new colors, too—colors the audience had never seen before—was what fundamentally caused the crowd to murmur with excitement, particularly regarding their use of pastel purples, powdery oranges, and light pastel greens.

2ND NIGHT:
GROUP VISION SHOW/BRAZIL

The Brazilian team, Group Vision Show, had competed once before in Vancouver at the Celebration of Light in 2012. They managed to capture the audience's imagination with their selection of incredible music and their wonderful use of design. In the months leading up to their highly anticipated return visit, there was a great deal of speculation about what Brazil would do during their segment. As they arrived at the beach on the night of their display, it was immediately obvious that the huge crowd gathered there was almost a third larger than China's three days earlier. As the crowd-led countdown began, it was also apparent Brazil had captured the audience before their very first shots even hit the air.

Brazil's display began fearlessly with all of the glitter and glitz—a combination of symmetry and pattern shells, wide comet displays and floral, feathery patterns—you

HONDA
CELEBRATION

would expect from the land of carnival. The Brazilian music also heightened the excitement of the crowd tremendously as the raucous shells burst, and people further back from the beach (where the audience typically stands) all began dancing! Honestly, what more could a display team ask for? As the display progressed, Group Vision Show expanded their showmanship even further by adeptly using aquatic shells and cakes as beat punctuation (something China had failed to use at all). Amazingly, the Brazilian display managed to keep up their intense pace and powerful rhythm throughout their entire display, and the crowd loved it. If this show was any indication of what to expect during the 2016 Olympics, then we're in for an absolutely amazing opening ceremony.

3RD NIGHT:
ARCHANGEL FIREWORKS/CANADA

After the Brazilian sensation cooled down a little, it was up to the Canadian Archangel Fireworks team to make certain that their pre-display hype was equal to the buzz about them circulating all around Vancouver. They definitely had the home court advantage, but they would have to prove themselves to win the hearts of the audience—especially after two excellent shows already.

Everywhere in Vancouver people were talking about the previous shows, about China's colors and Brazil's wonderful displays and music. Everyone was so excited, in fact, that no one considered the weather and how it might affect the Canadian team.

Canada's shoot day began very tensely. The air was thick and the clouds hung dark and ominously low on the edges of a city preparing to watch history unfold. Fortunately, the show had been setup quickly enough that it left some time for Mother Nature to figure out her nighttime plan. Everyone began worrying it would rain, and the thick, unmoving air didn't help the mood of the crowd. The photographers crossed their fingers, and the parents packed garbage bags for their children to wear as ponchos just in case the heavens opened up that night.

Archangel Fireworks started the show by kicking open the door and staging an almost finale-level introduction in place of a safe, gently progressive opening. Instead of any kind of buildup, they launched an all out onslaught of fireworks during their first minute, all to the pounding song "Sabotage" by the Beastie Boys. It not only raised the eyebrows of the crowd, but their heart rates as well. The only thing louder than the fireworks after the first minute were deafening cheers of the audience.

In an attempt to let some of the smoke drift away, Archangel Fireworks then slowed the pace a little to begin using its much large shells to the accompaniment of the lyrics of "Say It Ain't So" by Weezer. In a sense it echoed the sentiment of the crowd because the persistent smoke was choking out some of the lower level effects. (Hey, at least it wasn't raining). Rapidly changing pace once again for their 3rd scene was another onslaught of screaming fireworks and music to the pulse of Freddy Mercury's "Don't stop me now I'm having such a good time." Thoughts of all the smoke quickly disappeared entirely as larger shells and innovative ground level work continued battering the crowd like a "Wrecking Ball" for their 4th scene. By this point the audience couldn't believe their eyes and ears as an almost lyrical symbiosis between themselves and the fireworks began. Then without a moments notice, Eminem started his "One Shot" as another micro finale in mid show began, complete with an amazing aquatic spectacle that literally stole the show and gave Canada a commanding lead over its competitors.

Canada's perfect musical selection was so thorough throughout the second half of its show design, that by the final scene the entire audience all knew what was coming up next and were simultaneously cheering and singing along with the lyrics, "Some nights I stay up cashing in my bad luck, some nights I call it a draw."

In the end it wasn't a draw.

So, how do you win competition like "The Honda Celebration of Light"? Well, it starts with great fireworks, creativity, great music selection and a thorough understanding of the crowd. Oh, it also helps if it doesn't rain. Overall, Archangel Fireworks created a knockout of a show, and that's what won them the cup. Such is the nature of celebrating light and fireworks in the Pacific Northwest. ■

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Lighting up the sky in Trenton, Michigan on the 4th of July

TRENTON, MICHIGAN

ON THE 4TH OF JULY

Written by Zachary Olds of Zolds Photography

Thanks to the generous sponsorship of Fritz Enterprises, the city of Trenton was able to put on an amazing fireworks show this past 4th of July. Trenton is a relatively small town (just shy of 20,000 people) located about 23 miles south of Detroit. What makes this show particularly beautiful is its location: Rotary Park directly on the Detroit River. Fireworks displays on this river are particularly beautiful, and the park itself has a reputation for being well kept and especially scenic.

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This was the 5th year in a row that the size of the show has been expanded, and although Trenton is a relatively small town, it now boasts one of the largest fireworks displays in all of Michigan.

Although there was a concert scheduled in the park right before the fireworks, we mistakenly left only about a half hour before the 10:00 PM start time. That wasn't good planning on our part because we ended up getting stuck behind a rotating bridge that turned to let boats pass through, and then frustratingly behind a driver traveling only about 5 mph the rest of the way. We somehow managed to park about five minutes before the show and miraculously managed to make it to the water's edge with 2 minutes to spare!

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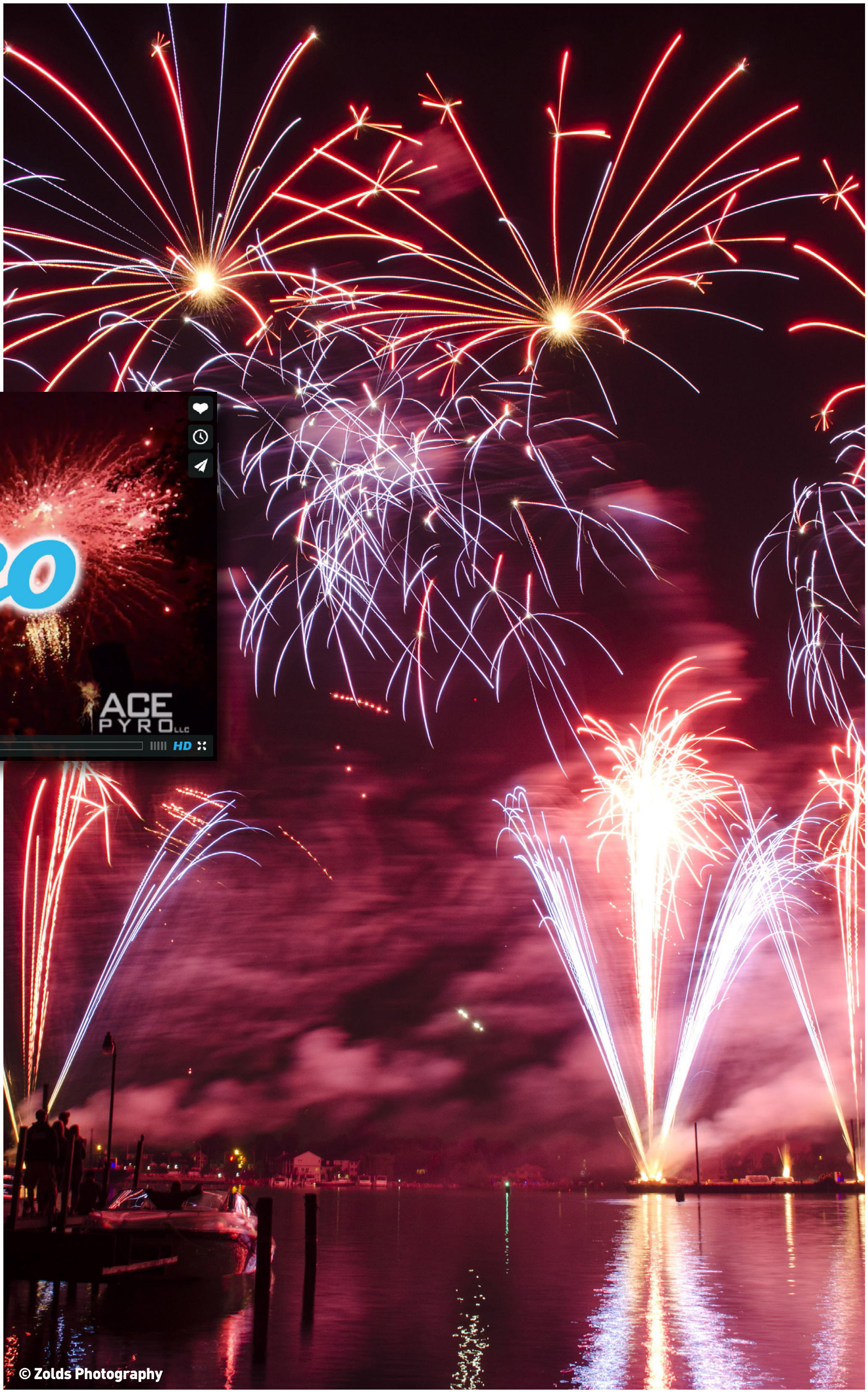
TRENTON, MICHIGAN

ON THE 4TH OF JULY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Was it worth the trouble? OMG, yes! This beautiful pyromusical display was wonderfully choreographed to an excellent mixture of music that ranged from 50s rock 'n' roll to Stravinsky's Firebird Suite—all music that thoroughly enhanced the brilliance of the colorful displays. The fact that the music was simulcast on local radio also made certain that music filled the entire park just like color filled the entire night sky.

They shot some phenomenal fireworks that evening, too—many types I have never seen before. This huge diversity of shells then ended with "God Bless America" to a finale that almost made my heart stop. No wonder this display was rated the top firework display in Michigan this year. Kudos to the city of Trenton, Fritz Enterprises, and the creative genius of Ace Pyro (www.acepyro.com) for putting on such a spectacular show!

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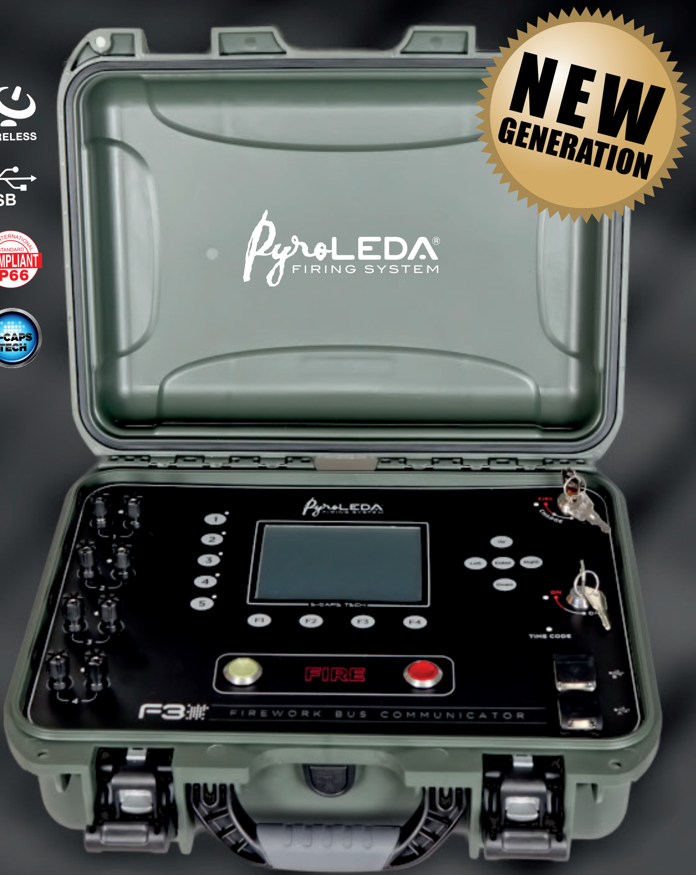

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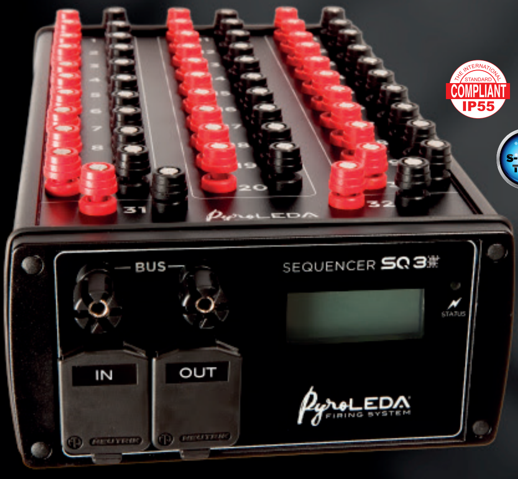

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